Course Title: Microprocessor For Industrial Application **Course Code: EEA 109**

Course Background / Summary:

This course will provide participants with knowledge about Microprocessors, and the associated devices such as I/Os, memories, RAM, ROM, etc. They will be exposed to programming, wiring connectivity, monitoring and measuring I/O signals, and troubleshooting the errors encountered with electrical wiring or programming.

Course Objectives:

- Describe the functionality of Microprocessor circuits and their associated peripherals, and interpret their programming and give a description of their operation.
- Familiarize with Intel 8085.
- Interpret, define and analyze the existing program and describe the expected input, output of Microprocessor.

Target Audience:

- Industrial workers from operators, technicians to engineers
- Teaching staff/ instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to MIiroprocessor

2.0 Basic Programming Technique

3.0 Data and I/O Manipulation Technique

4.0 Analog Systems Programming

5.0 Learning Project Microprocessor Controls

Course Title: PIC Microcontroller in C Language Course Code: EEA 111

Course Background / Summary:

Microcontrollers are small, inexpensive computers that are used in a wide range of applications including portable communication devices, appliances, industrial control, and data logging systems. They eliminate the expense and complexity of using a full microprocessor when sensing and processing information. This subject will expose the participant to hardware, software, design, and interfacing aspects of the single-chip microcontroller which are used as controllers in embedded systems.

Course Objectives:

- Enhanced knowledge of PIC and programming in C language.
- Develop and program controlling devices using C language.
- Create and perform wiring connections from and to the devices.
- Download programs into PIC, test, and display output results.

Target Audience:

- Professionals involved in creating and developing embedded application systems with microcontrollers
- Lecturers/ Academicians/Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Microcontroller	**5.0 Program Control Structures**
2.0 Basic structure of C- programming	**6.0 Functions**
3.0 Variable & Constants	**7.0 Pointers and Array**
4.0 Operators	**8.0 Projects**

Course Title: Process Control System — Course Code: EEA 112

Course Background / Summary:

This course focuses on a practical approach, beginning with an open loop and close loop system. Participants will be exposed to several tuning methods and experience PID tuning for several systems such as (speed motor control, position control, temperature control, level control, and flow control). Several sensors related to the system and techniques to calibrate the sensors also will be covered. Depending on the participants' performance/achievement Digital control (using a PLC or Micro P/Micro C to control the system) can be offered as an added value for this course.

Course Objectives:

- To introduce the participants to the basic and intermediate process Control System which covers theory and practical hands-on.

Target Audience:

- Technicians
- Engineers
- Research students, Lecturers, and Technical Training Officers

Course Duration: 2 Days

Course Contents

1.0 Introduction to Sensors and Measuring Device

2.0 Control System (Open Loop and Close Loop)

3.0 PID

4.0 Tuning Method

Course Title: Power Electronics & Drives Course Code: EEA 113 (i)

Course Background / Summary:

The purpose of this course is to provide a comprehensive review of industrial power electronic converters and motor drives. Practical topologies of different types of power electronic converters will be covered, including industrial high-voltage and high-current applications, protection, and cooling. Common industrial motor drives are examined with popular control techniques (PWM) and simplified modeling.

Course Objectives:

- Analyze three-phase systems (voltage, current, power, and power factor).
- Understand the concepts of alternating current theory.
- Explain the working and signals of different types of power electronics in different types of switched power converters - rectifiers, inverters, and choppers.

Target Audience:

- Technicians and engineers from different engineering disciplines
- Teaching staff/instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction (Power Electronics Components)

2.0 Uncontrolled and Controlled Rectifiers (Single-Phase and Three-Phase Rectifiers)

3.0 Chopper- Switched Power Supply with Different Topologies (BUCK, BOOST, CUK etc.)

4.0 AC - AC converters

5.0 Inverters

6.0 Drives

Course Title: Advanced Power Electronics Course Code: EEA 113 (ii)

Course Background / Summary:

Modern energy conversion systems rely on the integration of a range of technologies including power electronics, electromechanical actuators, and energy storage elements. This course introduces and analyses electrical machines and powers electronic systems for high-power applications; for example, industrial and traction drives, small-scale power generation, and power system control. This course will build knowledge of building block technologies and show their application to modern energy conversion systems.

Course Objectives:

- Select and design appropriate converter interfaces for DC/AC and AC/DC power conversion applications at a high power level.
- Select appropriate control schemes and sub-system components.
- Be able to design snubbers and voltage/current sharing systems for power electronic devices
- Understand power quality issues related to AC/DC converters.

Target Audience:

- Technicians involved in manufacturing, assembly, and maintenance of automation systems.

Course Duration: 2 Days

Course Contents

1.0 The use of Power Electronics in AC power systems

- Facts devices, Ratings of High Power IGBTs and IGCTs, Windfarms, Voltage-sourced and current-sourced HVDC, Techniques for connecting devices in Parallel and Series to boost power ratings, Snubbers.

2.0 Power Electronics and Power Converters

- Overview of semiconductor switches - Diodes, IGBTs, MOSFETs
- Boost/buck converters - operation, control, and design
- Multi-phase converters - operation, control, and design
- Switching strategies of converters

3.0 Applications

- Electric Vehicle: Power Electronics Technology, Design the battery charger.
- Wind generator systems: General types of electric machines, Converter types, and configurations.
- Photovoltaic Generators: General types of silicon photovoltaic, PV configurations and integration.

Course Title: Basic Electric Motor Control — Course Code: EEA 114

Course Background / Summary:

This course provides a hands-on approach to the motor control system utilizing common types of motor starters. Participants in this course will be able to perform and understand electric motor control by applying the knowledge and skills related to electrical devices and control.

Course Objectives:

- Familiarize with electric technology and control
- Execute electrical control wiring installation on electric motor
- Apply the knowledge gained to design simple projects based on electric motor technology

Target Audience:

- Industrial workers from operators to technicians
- Electronics & Electrical Technologists, Engineers
- Teaching staff/instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Electrical Control System

2.0 Fundamental of Electric Motor

3.0 Practical Applications on Electric Motor

Course Title: Measurement, Instrumentation & Sensors

Course Code: EEA 116

Course Background / Summary:

The participants will be exposed to 18 different types of analog and digital sensors. We will cover topics on sensor characteristics, working operations, selections, and applications for several different working operations/conditions. The participants will have "hands-on" experience on sensor installation and conduct necessary wiring with associated circuits (signal conditioning circuits). The participants will also experience tuning/calibrating, capturing, monitoring, and processing analog sensors with analog and digital controllers.

Course Objectives:

- Learn to familiarize with several types of analog and digital sensors.
- Tuning/Calibrating sensors.
- Monitoring, capturing and processing the sensor signal.
- Apply the knowledge gained to design and program simple projects.

Target Audience:

- Industrial workers from operators to technicians
- Electronics & Electrical Technologists, Engineers
- Teaching staff/ instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Sensors: Digital and Analog sensors

2.0 Speed Sensors

3.0 Incremental Encoder

4.0 Absolute Encoders

5.0 Potentiometers for Position Sensor

6.0 AD590 Temperature Sensors

7.0 Thermocouple Temperature Sensors

8.0 PTC Temperature Sensors

9.0 PT100 Temperature Sensors

10.0 Capacitive Sensor for Level Detection

11.0 Potentiometers for Level Detection

12.0 Ultrasonic Sensors for Level Detection

13.0 Pressure Level Sensors

14.0 Turbine for Flow Rate Sensors

15.0 Differential Pressure for Flow Rate Sensors

16.0 Accelerometer Sensors

17.0 LVDT

18.0 Stress-Strain Gauges

19.0 Speed Pickup Sensors

Course Title: Mechatronics (Level 1) Course Code: EEA 117 (L1)

Course Background / Summary:

This is an introductory course to various control media that is used in automation systems and explains the operation of some of the components used to allow the delegates to compare control methods. This course covers topics on the control of pneumatic actuators using pneumatic and electrical signaling devices together with the use of PLC. The construction and operation of valves and sensors are examined and used in the construction of control circuits.

Course Objectives:

- Read and understand pneumatic circuit diagrams to recognize international standards.
- Read and understand simple PLC programs.
- Recognize pneumatic and electrical components and understand their functions.
- Recognize the parts of simple PLC systems and understand their functions.
- Construct simple pneumatic, electro-pneumatic, and PLC control circuits.
- Determine how pneumatic, electro-pneumatic, and PLC systems interface with each other.
- Compare pneumatic, electro-pneumatic, and PLC systems as solutions to simple application.

Target Audience:

- Personnel involved in the design, installation, or maintenance of systems that contain pneumatic, electro-pneumatic, and PLC equipment

Course Duration: 3 Days

Course Contents

1.0 Introduction to Mechatronics

2.0 Pneumatic & Electro-pneumatics

3.0 Electrical Control and PLC

Course Title: Mechatronics (Level 2) Course Code: EEA 117 (L2)

Course Background / Summary:

Today we are surrounded by automation systems which are combination of mechanical engineering, electronics and software. This course provides the participants an understanding on mechatronics and lay out the foundation for mastery of industrial automation, enables them to commission, operate, adjust and maintain these machines.

Course Objectives:

- Analyze and test basic mechatronic circuits (pneumatic, electrical, and software)
- Download programs and commission a simple PLC control system
- Identify and describe the operation of pneumatic, electro-pneumatic, electrical and PLC components and sensors
- Interpret technical specifications and data relating to pneumatic, electro-pneumatic, sensor, electrical and PLC components and systems
- Troubleshoot basic Mechatronic control systems
- Use diagnostic software to assist troubleshooting

Target Audience:

- Electricians, Technicians, Engineers, Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Mechatronic Control Systems e.g., FMS	**6.0 Vacuum Equipment**
2.0 Manipulators in Flexible Cells	**7.0 Sensors**
3.0 Linear Actuators	**8.0 Characteristic PLC control**
4.0 Rotary Actuators	**9.0 Mitsubishi FX Series (GX Developer) PLC Programming**
5.0 Air Gripper	

Course Title: Industrial Robotics — Course Code: EEA 118

Course Background / Summary:

Participants will be taught about different types of built-ups of industrial robots, different applications of industrial robots, and parts of an industrial robot. This module will help them to study the movement systems of a robot and how to use the system in each case through robot programming.

Course Objectives:

- Describe the use of several devices for data entering and management used in the programming of robots, handling devices, and the CIM environment.
- Explain the operation sequence on an automated system.
- Identify the code which is being performed at each moment depending on the element in question.
- Work out robot and system management programs.
- Perform simulation of programmable systems
- Transfer robot and management program from a source file on a system.
- Place tools and devices in accordance with programmed operation sequence and check operation status.
- Perform a dry run to check the operation of the system.
- Modify parts of the programs that show deviations during the verification process.

Target Audience:

- Industrial workers from operators, and technicians to engineers, teaching staffs (vocational & technical teachers).
- Technicians and maintenance personnel involved in the setup, tuning, and troubleshooting of electro-hydraulic proportional and servo systems.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Robotics	**4.0 Introduction to Programming**
2.0 Structure and Features of Industrial Robots	**5.0 Instructions in Movement Control.**
3.0 Programming Systems of Industrial Robots	**6.0 Inputs and Outputs**

Course Title: Electronic Packaging — Course Code: EEA 123

Course Background / Summary:

This course is designed and focused on the fundamentals of electronic packaging theory/concepts and how electronic packaging is designed and manufactured. Among the topics covered are an introduction to electronic packaging, materials in electronic packaging, package and board assembly, electronic packaging components, equipment and processes, and quality and reliability (Q&R) in electronic packaging.

Course Objectives:

- Understand the fundamentals of electronic packaging.
- Understand electronic packaging developments and manufacturing processes.
- Familiarize with the materials in electronic packaging.

Target Audience:

- Industrial workers from engineers to senior engineers, managers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Electronic Packaging

2.0 Overview of Materials in Electronic Packaging

3.0 IC Package Assembly and Board Assembly

4.0 Quality and Reliability in Electronic Packaging

5.0 Interconnect Technology and Materials

6.0 Polymer Materials for Electronic Packaging

7.0 Thermals

8.0 Substrates

9.0 Materials Characterization

Course Title: Sensor Technology Application Course Code: EEA 124

Course Background / Summary:

Professionals involved in manufacturing, automation, assembly, and maintenance. Technical personnel, trainers, and instructor who wish to widen their knowledge of sensor technology and application.

Course Objectives:

- Understand the basic principles of sensor technology
- Identify various types of sensors used in industries
- Describe the operating principles of various types of sensors used in industries
- Describe the advantages and disadvantages of various sensors identify appropriate applications for sensors

Target Audience:

- Professionals involved in manufacturing, automation, assembly and maintenance, vocational training center, etc.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Electronics and Circuit

2.0 Introduction to Sensors

3.0 Types of Sensors

4.0 Application of Each Type of Sensors

5.0 Sensor Connection of Techniques

Course Title: Advanced Manufacturing Technology — Course Code: EEA 126

Course Background / Summary:

This subject is a combination of PLC, robotics, FMS, and other basic automation systems. Participants will be exposed to PLC hardware and software. Almost all PLC programming will be in digital programming. For the automation system, participants will learn two basic concepts of automated manufacturing systems such as robotics and FMS.

Course Objectives:

- Familiarize with the Automation system, e.g., FMS (Flexible Manufacturing System); functionality features, etc.
- Explain the structure, concepts, working operation, and the advantages and disadvantages of PLC compared to the electrical control techniques.
- Familiarize students with automated manufacturing systems.
- Demonstrate how to configure PLC with other devices and download and test the output result.

Target Audience:

- Personnel involved in the design, installation, or maintenance of systems that contain pneumatic, electro-pneumatic, and PLC equipment.

Course Duration: 3 Days

Course Contents

1.0 Introduction to automated systems
- Automated manufacturing overview, Components in automation

2.0 Introduction to PLC
- Fundamental of Logic, Basic of PLC Programming

3.0 Automated systems
- Introduction to Robotics, Automated work cell e.g. FMS Application

Course Title: Motion Control Technology — Course Code: EEA 127

Course Background / Summary:

Motion control is an important part of robotics and CNC machine tools. Concept Systems is the leader in motion control systems. Whether your application calls for PLC-based motion, CNC, robotics, electric servo control, and/or hydraulic servo control, Concept Systems can provide the know-how to ensure it is integrated properly. Concept Systems has expertise in all the major motion control platforms. More importantly, Concept Systems excels at matching the technology with the application. Concept Systems is dedicated to being on the leading edge of motion control technology and delivering the benefits to you. It provides you with a general understanding of the Motion Control System. Participants will be given chances to work on a modeled motion system during practical sessions.

Course Objectives:

- Differentiate parts included in the electrical part of a motion control system.
- Interpret the electric diagram of a motion control system.
- Write motion programming the controller on a machine.
- Analyse the setting of machine parameters.

Target Audience:

- Industrial workers, Teaching staff/instructors
- Professionals involved in manufacturing, assembly, and maintenance

Course Duration: 3 Days

Course Contents

1.0 Introduction to Motion Control System: Open Loop Motion Control, Closed Loop Motion Control

2.0 Motion Control System Elements: Motor Technology, Drive, Feedback Devices

3.0 Electrical Diagram of a Motion Control System

4.0 Introduction to Motion Programming

5.0 Control Introduction: Control Mode Conception, Machine parameters

6.0 Potential Problems & Troubleshooting

Course Title: Motor Controller For Machine Maintenance — Course Code: EEA 128

Course Background / Summary:

Professionals involved in manufacturing, assembly, and maintenance. Machinists, trainers, and instructors who wish to widen their knowledge of electricity on machine tools.

Course Objectives:

- Differentiate electrical magnitudes and measure on an electrical circuit.
- Differentiate control, regulation, and protection components.
- Assemble electrical circuits from a given diagram.
- Perform power and control circuits on electrical automatons with asynchronous three-phase and dc motors.
- Interpret the electric diagram of machine tools.
- Perform troubleshooting on machine tools

Target Audience:

- Professionals involved in manufacturing, assembly and maintenance and vocational training center

Course Duration: 3 Days

Course Contents

1.0 Basic electricity	**6.0 Synchronous Motors**
2.0 Electric Components for Signal Input	**7.0 Direct Current Motors**
3.0 Signaling Elements	**8.0 Intro to Machine Tools System and Operation, Fault Finding Techniques, etc.**
4.0 Electric Components for Signal Processing	**9.0 Maintenance of Electric Systems of Machine Tools**
5.0 Electrical Protection Elements	

Course Title: Automotive Technology — Course Code: EEA 129

Course Background / Summary:

This course is will give exposure to the participants on the fundamentals of automotive technology such as drive line, drive train, vehicle construction and application of vehicle functions. This course will also cover the basic knowledge in automotive electrical systems, equipment and their working details. The topics include starting system, charging system, ignition system, lighting and signalling system, other automotive electrical accessories. In the final module, participants will be given exposure on the new cutting-edge technology of hybrid electric vehicles.

Course Objectives:

- Evaluate mechanical packaging of driveline such as engine position, differential, axle, suspension system, brake system, fuel tank and cooling system.
- Interpret the layout of wiring and perform installation connections of electrical systems in automobiles.
- Describe the basic topologies of hybrid vehicles system and its components.

Target Audience:

- Engineers, Fresh Graduates, Retiree, Automotive Hobbyist

Course Duration: 3 Days

Course Contents

1.0 Vehicle Chassis

2.0 Driveline

3.0 Automotive Electrical and Electronics System

4.0 Introduction to Hybrid Vehicles

Course Title: Robotic & Control System (with Microcontroller) Course Code: EEA 131

Course Background / Summary:

Robotic systems can be viewed as a subset of Mechatronics that focuses on sophisticated control of moving devices. The aim of this course is to expose participants to the fundamentals of making a robot using microcontroller, feedback sensor/encoder, C programming, and interface/link with motor actuators.

Course Objectives:

- Define industrial robot & recognize other robotic devices.
- Microcontroller PIC as the robot brain.
- Microcontroller interface to sensors and actuator for a robot.
- C programming for robot.
- PID control algorithm with C programming.

Target Audience:

- Electricians, Technicians, Engineers, Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Robotics

2.0 Design robotic circuit

3.0 Microcontroller and interfacing for robotics

4.0 Robotic programming with sensors and encoder

5.0 PID control algorithm for robot control

Course Title: Control and Sensor App On Wheel Robot

Course Code: EEA 135

Course Background / Summary:

Mobile robots have the capability to move around in their environment and are not fixed to one physical location. In contrast, industrial robots usually consist of a jointed arm (multi-linked manipulator) and gripper assembly (or end effector) that is attached to a fixed surface. Mobile robots are the focus of a great deal of current research and almost every major university has one or more labs that focus on mobile robot research. Mobile robots are also found in industry, military, and security environments. They also appear as consumer products, for entertainment or to perform certain tasks like a vacuum. Participants will have a better understanding of the design and development of mobile wheel robots and will be able to explore the potential and creativity in a robotics application.

Course Objectives:

- To introduce the participants to the basic and intermediate process Control System which covers theory and practical hands-on.

Target Audience:

- Engineers and technicians that involved in Mechatronic applications
- Teaching staffs (including vocational and technical teachers) that teach and interested in Mechatronics and wheel mobile robot

Course Duration: 3 Days

Course Contents

1.0 Introduction to Mobile Robot Technology	**6.0 Application of Mechanical CAD in Designing Wheel Mobile Robot**
2.0 Mechanical Design in Wheel Mobile Robot	**7.0 Robot Parts Fabrication, Tools and Machining – Lathe, Milling, & Bench work**
3.0 Electrical Design in Wheel Mobile Robot	**8.0 Wheel Mobile Robot Assembly (Chassis & Drive Train)**
4.0 Mechanical Components in Mobile Robot	**9.0 Type of Sensor used in Mobile Robot**
5.0 Fundamentals of Mechanical CAD in Mobile Robot	

Course Title: PIC Embedded Mobile Robot Hands on Workshop Course Code: EEA 136

Course Background / Summary:

The term of mobile robotics covers any robot that is able to move its own position, that can be wheeled, leg or any other movement concepts. The motion of the robot can be controlled using a handheld device or robot can be operated automatically. This course will cover the fundamental of mobile robot systems which include the mobile robot locomotion, the actuator system and common sensing devices used. The participants will be exposed with hand on skills to design and develop a mobile robot. The motion of a mobile robot is controlled by microcontroller. Microcontroller will act as 'brain' to coordinate the robot movement. In this course, the participant will also be exposed with microcontroller hardware. The participant will learn how to write and debug programming codes, interface peripheral devices with microcontroller and test the movement of mobile robots.

Course Objectives:

- Describe the world of mobile robots - how they move, how they interact with the world and how to build them.
- Construct electrical wiring for actuators and power system for mobile robot.
- Discuss the various sensory devices that commonly used in mobile robot.
- Explain the construction of microcontroller.
- Write the programming code to activate the mobile robot using microcontroller based hardware.

Target Audience:

- Anyone who is interested in gaining solid knowledge of the key elements of industrial automation to improve their work skills and to further their job prospects.
- Electrical Engineers and Electricians, Maintenance Engineers and Supervisors, Technical staffs & teachers.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Mobile Robot	5.0 Introduction to Microcontroller
2.0 Mobile Robot Locomotion	6.0 Write and Debug Programming Code
3.0 Actuator System for Mobile Robot	7.0 Write and Debug Programming Code
4.0 Sensing Devices for Mobile Robot	

Course Title: Diagnostics on AC Electric Motors Course Code: EEA 139

Course Background / Summary:

he course offers the total solution for AC motor control needs. Participants will obtain knowledge of the construction of AC motors, the control pilot device used, and the proper techniques to troubleshoot the motor failure. They will also be trained to perform wiring and testing motor control circuits. The contents include the description of the single and three-phase AC motors and the method to control the speed of the motor will be explained.

Course Objectives:

- Describe the construction of single and three-phase AC Motors.
- Test wiring circuits and troubleshooting.
- Master the techniques in controlling the directions and speed of an AC motor.

Target Audience:

- Electricians, Technicians, Engineers, Instructors

Course Duration: 3 Days

Course Contents

1.0 Theory Subjects

- Introduction to Electric Motors
- Control Pilot Devices
- Basic Troubleshooting Principles
- Troubleshooting Control Circuits
- Three Phase and Single-phase AC Motors
- Variable Speed Drive/AC Drive
- Motor Failure
- Motors Overload Protection

2.0 Practical Tasks

- Control Circuit: Construction And Troubleshooting
- Diagnosis Contactors
- Assemble and Dissemble AC Motors
- D.O.L for Three-phase and single-phase motors
- Autotransformers Starting Method
- Manual and Automated STAR-DELTA Starting
- Reversing AC Motors
- Speed Control for AC Motors

Course Title: Discovery and Diagnostics on Electrical and Electronics — Course Code: EEA 140

Course Background / Summary:

The concepts of electrical & electronics are mysterious. In this course, participants will be guided to discover the mysterious world of electrical & electronics. The complexity of electric circuits will be simplified, the electrical energy that flows in electrical devices will expose, and electrical & electronics theory as tomorrow's solutions will be innovated.

Course Objectives:

- Recognize interrelationship between electrical & electronics and another field
- Define voltage, current, and power.
- Measure and troubleshoot using appropriate tools.
- Design and fabricate electrical and electronic circuits.

Target Audience:

- Electricians, Technicians, Engineers, Instructors

Course Duration: 3 Days

Course Contents

1.0 Theory Subjects

- Circuits, Currents, and Voltages
- DC Voltage
- AC Voltage
- Resistive Circuit
- Inductance and Capacitance
- Power and Energy
- Logic Circuits
- Operational Amplifiers
- Diode, Power Transistors

2.0 Practical Tasks

- Measurement Techniques
- Resistor Color Code
- Soldering Skills
- Practical on Oscilloscope
- Fabricate and Diagnose Basic Power Supply
- Design and Simulate a Digital Circuit

Course Title: Hybrid and Electric Vehicle Technology

Course Code: EEA 141

Course Background / Summary:

This training will provide the participants with fundamental knowledge of hybrid vehicles. The topics in this training will cover the description of the operations of a hybrid system, the transmission operation, the battery system, and motor generators. During the practical session, our participants will learn the know-how of standard operating procedures to perform troubleshooting works correctly and safely.

Course Objectives:

- Describe the basic topologies of the hybrid vehicle system.
- Evaluate the hybrid transmission system.
- Troubleshoot the battery system.
- Analyses the hybrid operations during engine, battery, or engine battery and battery running modes.

Target Audience:

- Engineers, Fresh Graduates, Industrial Workers, Retirees, Automotive Hobbyist

Course Duration: 3 Days

Course Contents

1.0 Introduction to Hybrid Vehicles

2.0 Hybrid Transmission System

3.0 Hybrid Battery

4.0 Hybrid Electrical Propulsion

Course Title: Arduino for Control System Application — Course Code: EEA 142

Course Background / Summary:

Arduino is one of the best and cheapest embedded microcontrollers, yet a powerful tool for automation and control of several engineering applications. This course will introduce and apply the Arduino Mega, 2560 for control system applications such as speed, position, level, and temperature control.

Course Objectives:

- C Program of Arduino Mega 2560.
- Interface Arduino Mega with sensors and actuators.
- Utilize Arduino to Control speed, position, level, and temperature.
- Theory knowledge of control system.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Microcontroller and Arduino

2.0 Basic Theory of Control System

3.0 Arduino Data Transfer and Communication with MATLAB/Simulink

4.0 Arduino C Programming

Course Title: Arduino Programming Using MATLAB/ Simulink for Control System Application

Course Code: EEA 143

Course Background / Summary:

Arduino is one of the best and cheapest embedded microcontroller, but yet powerful tool for automation and control of several engineering applications. This course will introduce and apply the Arduino Mega 2560 in TARGET MODE for control system application such as speed, position, level and temperature control.

Course Objectives:

- Program Arduino using Target method with MATLAB/Simulink.
- Download Program to Arduino Mega 2560.
- Interface Arduino Mega with sensors and actuators.
- Utilize Arduino MEGA in target mode for Control speed, position, level and temperature.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Microcontroller and Arduino Mega 2560

2.0 Basic Theory on Control System

3.0 Arduino Programming Data Transfer using MATLAB/ Simulink

4.0 Arduino Programming with MATLAB/ Simulink in Target Mode

Course Title: Arduino Mega 2560 for Motor Control Application

Course Code: EEA 144

Course Background / Summary:

Arduino is one of the best and cheapest embedded microcontroller, but yet powerful tool for automation and control of several engineering applications. This course will introduce and apply the Arduino Mega 2560 for motor control such as AC and DC motor, RC servo motor, stepper motor

Course Objectives:

- C Programming of Arduino Mega 2560.
- Interface Arduino Mega with buttons, sensors and actuators.
- Utilize Arduino Mega for Control AC and DC machine, RC servo motor and stepper motor.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Microcontroller and Arduino

2.0 Basic Theory on AC and DC Machine, RC Servo Motor and Stepper Motor

3.0 Interfacing Arduino with Sensors and Actuators of Electrical Machine Devices

4.0 Arduino C Programming Motor Control

Course Title: Arduino 2560 for Pneumatics & Hydraulics Application

Course Code: EEA 145

Course Background / Summary:

Arduino is one of the best and cheapest embedded microcontrollers yet a powerful tool for automation and control of several engineering applications. This course will introduce and apply the Arduino Mega 2560 for pneumatics and hydraulics application. This includes basic control, system diversion, and system alternation.

Course Objectives:

- C Programming of Arduino Mega 2560
- Interface Arduino Mega with buttons, sensors, and actuators
- Utilize Arduino Mega for Pneumatics and Hydraulics application

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Engineers
- Instructors

Course Duration: Min: 3 Days, Max: 5 Days

Course Contents

1.0 Introduction to Microcontroller and Arduino

2.0 Basic Theory on Pneumatics and Hydraulics System

3.0 Interfacing of Arduino with Sensors and Actuators of Hydraulics and Pneumatics Devices

4.0 Arduino C Programming Motor Control

Course Title: Digital Electronics for Motor Control Application

Course Code: EEA 146

Course Background / Summary:

Digital electronics are an important element being used for electronics, automation systems for house appliances, and industry. This course will introduce the participants to make use of and apply this electronics circuit IC (AND, OR, 555 TIMER, SR, JK., etc) for the application of motor control.

Course Objectives:

- Acknowledge digital circuit elements for motor control
- Control DC and AC machine, stepper motor, and RC servo motor

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Electronic Circuit

2.0 Introduction to Basic AC and DC Machine, Stepper Motor, and RC Servo Motor

3.0 Construct Circuit for Motor Control Application

4.0 Commissioning, Testing, and Fault Finding Circuit using Oscilloscope

Course Title: Digital Electronics for Pneumatics & Hydraulics Application Course Code: EEA 147

Course Background / Summary:

Digital electronics are an important element being used for electronics, automation systems for house appliances, and industry. This course will introduce the participants to make use of and apply this electronics circuit IC (AND, OR,555 TIMER, SR, etc.) for the application of motor control.

Course Objectives:

- Acknowledge digital circuit elements for pneumatics and hydraulics application.
- Control pneumatics and hydraulics application with timer, counter, system alternate, and system diversion.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Engineers
- Instructors

Course Duration: Min: 3 Days, Max: 5 Days

Course Contents

1.0 Introduction to Electronic Circuit Karnaugh Map.

2.0 Introduction to Basic Pneumatics and Hydraulics Theory.

3.0 Construct Circuit for Pneumatics and Hydraulics Application with Digital Circuit.

4.0 Commissioning, Testing, and Fault-Finding Circuit using Oscilloscope.

Course Title: DIY Data Acquisition (DAQ) using PIC Microcontroller and Communicate to MATLAB or LabVIEW

Course Code: EEA 148

Course Background / Summary:

DAQ is an important device/equipment in research and development. It is used to acquire data from any studied system for further analysis. This course will introduce participants on how to build Data Acquisition Card (DAQ) using PIC Microcontroller from scratch. Upon completion a C code for communicating the DAQ with MATLAB/ Simulink will be covered and implemented.

Course Objectives:

- Construct DAQ circuit
- Write C code for data transfer and software communication.
- Communicate DAQ with MATLAB/Simulink or Labview.
- Testing in reading data from sensors and actuators and read it from MATLAB/Simulink or Labview.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to PIC Microcontroller and DAQ

2.0 MATLAB/ Simulink for Communication

3.0 Labview for Data Transfer and Communication

4.0 C Code Programming for Data Communication

Course Title: Build Your Own DC to AC Converter using Microcontroller and Communication via MATLAB or LabVIEW

Course Code: EEA 149

Course Background / Summary:

DC to DC converter/Chopper is used to control the voltage and current of a converter for controlling the speed and torque of DC machines. PIC microcontroller will be used as a Digital controller for controlling the converter. This course will introduce participants to how to build a DC-DC converter and controller using a PIC microcontroller from scratch and also to write a control C code algorithm to control the DC-DC converter.

Course Objectives:

- Construct a DC-DC converter.
- Write C code control algorithm to control the converter.
- Communicate the converter with MATLAB/Simulink to analyze or monitor data.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to DC_DC Converter/ Chopper

2.0 Introduction to PIC Microcontroller

3.0 Construct the Converter and Interface to a PIC Microcontroller

4.0 C Code Programming for Converter Control Algorithm

Course Title: DIY Digital PID Using Microcontroller & Communication Via MATLAB Simulink or LabVIEW

Course Code: EEA 150

Course Background / Summary:

Digital PID is an important instrument in the control system. Without its precise control of any system would be impossible. This course will introduce participants to how to build/construct digital PID from scratch, by using PIC Microcontroller as a controller. Participants will also learn to write C code PID control algorithm for control purposes.

Course Objectives:

- Construct a Digital PID circuit
- Write C code for the PID control algorithm and test to control the speed system
- Communicate Digital PID with MATLAB/Simulink

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to PID Control System Theory

2.0 Introduction to PIC Microcontroller

3.0 Construct and Communicate PIC Microcontroller to the Sensor and Actuator

4.0 C Code Programming for the PID Control Algorithm

Course Title: DSP with MATLAB/ Simulink for Control System Application

Course Code: EEA 151

Course Background / Summary:

Matlab/Simulink has been widely used in Engineering research environments due to the ability of the software for complex computation in several engineering fields. This course will introduce participants to how to make use of DSP (Digital signal processing from Texas instrument (TMS2385) for control system application. The program is done through TARGET using MATLAB/Simulink. The study system will be speed, position, and level.

Course Objectives:

- Program DSP using Target method with MATLAB/Simulink
- Download Program to DSP TMS2385
- Interface DSP with sensors and actuators
- Utilize DSP in target mode for Control speed, position, level, and temperature

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to PIC Microcontroller and DSP Instrument

2.0 Basic Theory of Control System

3.0 DSP Programming Data Transfer using MATLAB/Simulink

4.0 DSP Programming with MATLAB/Simulink in Target Mode

Course Title: Fuzzy Logic Using MATLAB/ Simulink for Control System Application

Course Code: EEA 152

Course Background / Summary:

Fuzzy Logic has been widely applied in industry and home appliances for several applications from complex systems such as aircraft to washing machines which is a less complex system. The flexibility of fuzzy logic makes it popular to be applied in control engineering. This course will introduce participants to how to make use of Fuzzy Logic control such as speed, position, level, and temperature. It also exposes the participants to Arduino as an interface device to pass and receive control Fuzzy control algorithm from MATLAB/Simulink signals from sensors and actuators.

Course Objectives:

- Understand and make use of fuzzy logic to control applications such as speed, position, level, and temperature.
- Utilize MATLAB/Simulink as the processor to process fuzzy control.
- Use Arduino as the interface to pass and receive control variables from and to input sensors and actuators.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers

Course Duration: 3 Days

Course Contents

1.0 Basic Knowledge about MATLAB/Simulink

2.0 Theory of Control System

3.0 Construct Physical Based Model, Transfer Function, State Space from Linear Differential Equation

4.0 Control Speed, Position, Level System with Aid of System Identification and SISO tool.

Course Title: Fuzzy Logic Using PIC Microcontroller for Control System Application

Course Code: EEA 153

Course Background / Summary:

Fuzzy Logic has been widely applied in industry and home appliances for several applications from complex systems such as an aircraft to a washing machine which is a less complex system. The flexibility of fuzzy logic makes it popular to be applied in control engineering. This course will introduce participants to how to make use of Fuzzy Logic control such as speed, position, level, and temperature. PIC microcontroller will be the processing engine for this Fuzzy control algorithm.

Course Objectives:

- Understand and make use of fuzzy logic to control applications such as speed, position, level, and temperature.
- Utilize MATLAB/Simulink as the processor to process fuzzy control algorithm.
- Use PIC Microcontroller as Fuzzy processing engine and interface to pass and receive control variables from and to input sensors and actuators.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Basic Knowledge PIC Microcontroller

2.0 Theory of Fuzzy Logic Control System

3.0 Theory of Fuzzy Logic Control System

4.0 Control Speed, Position, Level System with Aid of System Identification and SISO tool

Course Title: Hardware in Loop Theory, Practical and Application for Control System Course Code: EEA 154

Course Background / Summary:

Hardware-in-Loop (HIL) simulation is a crucial technique in the field of control systems engineering. It involves integrating real-time hardware components with software simulations to validate and test control algorithms and systems. With the increasing complexity of control systems, HIL simulation has become an essential tool to ensure the reliability, performance, and safety of control systems before actual implementation. This course offers a comprehensive understanding of HIL theory, practical implementation, and its diverse applications across industries.

Course Objectives:

- Understand the fundamentals of Hardware-in-Loop (HIL) simulation and its significance in control system development.
- Grasp the theoretical underpinnings of HIL, including real-time simulation, modeling, and simulation interfacing.
- Apply HIL techniques to validate control algorithms, test hardware components, and identify potential issues.

Target Audience:

- Control system engineers.
- Hardware and software engineers.
- Researchers.

Course Duration: 4 Days

Course Contents

1.0 Introduction to Hardware-in-Loop (HIL) Simulation: Concepts and Importance

2.0 Real-time Simulation Fundamentals: Models, Simulators, and Time Synchronization

3.0 HIL Simulation Platforms and Tools: Overview and Selection Criteria

4.0 Hardware Integration: Sensors, Actuators, Controllers, and Plant Models

5.0 HIL Simulation Setup: Configuration, Calibration, and Interface Development

6.0 Validation and Testing: Control Algorithm Verification and Hardware Testing

Course Title: Processor in Loop Theory, Practical and Application for Control System

Course Code: EEA 155

Course Background / Summary:

As control systems become more complex and integrated, the Processor in Loop (PIL) technique has gained prominence for testing and validating control algorithms in real-time scenarios. PIL involves integrating a control algorithm with a processor-based hardware platform to emulate real-world conditions. This course delves into the theory, practical implementation, and applications of Processor in Loop, enabling participants to effectively design, test, and optimize control systems.

Course Objectives:

- Understand the foundational concepts of Processor in Loop (PIL) and its role in control system development.
- Grasp the theoretical framework of PIL, including processor integration, algorithm implementation, and real-time emulation.
- Explore diverse applications of PIL across industries, such as industrial automation, robotics, and more.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Engineers
- Instructors

Course Duration: 4 Days

Course Contents

1.0 Introduction to Processor in Loop (PIL) Simulation: Principles and Significance

2.0 PIL Simulation Platforms and Hardware: Selection Criteria and Compatibility

3.0 Algorithm Integration with Processor Hardware: Interface Development and Implementation

4.0 PIL Simulation Setup: Configuration, Calibration, and Realistic Environment Emulation

5.0 Validation and Optimization: Testing Control Algorithms under Realistic Conditions

Course Title: Discovery on Variable Speed Drives Course Code: EEA 156

Course Background / Summary:

Variable-speed drive (VSD) describes equipment used to control the speed of machinery. Many industrial processes such as assembly lines must operate at different speeds for different products. In industries, applications such as conveyors, centrifugal pumps, fans, and compressors use electrical motors to operate. Most motors are designed to operate at a constant speed and provide constant output; However, modern technology requires different speeds in many applications. In this course, participants will discover the concept of controlling electric motors such as AC motors, DC motors, and brushless DC (BLDC) motors.

Course Objective:

- Describe the need for VSD devices in typical industry applications.
- Identify the types of DC, AC, and BLDC motor drives.
- Perform the installation and testing of the VSD connection for electrical motors.

Target Audiences:

- Electricians, mechanics, reliability/maintenance managers, technical teachers

Course Duration: 3 Days

Course Contents

1.0 Module 1: The Need for Variable Speed Drives

2.0 Module 2: DC Motors and Drives

3.0 Module 3: AC Motors and Drives

4.0 Module 4: BLDC Motors and Drives

Course Title: Genetics Algorithm for Optimization of Engineering Process with MATLAB/ Simulink

Course Code: EEA 157

Course Background / Summary:

Genetics algorithm is one of the best tools for optimization. This course will introduce participants to how to make use of genetic algorithms for optimizing the PID gain and torque and current in parallel mode drive of four quadrants DC chopper.

Course Objectives:

- Use Genetics algorithm to optimize control application such as tuning PID controller.
- Familiarize with MATLAB/Simulink as the processing engine for this Genetics Algorithm.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians and Engineers
- Instructors

Course Duration: 3 Days

Course Contents

1.0 Basic Theory for Genetics Algorithm

2.0 Basic Knowledge of MATLAB/ Simulink and Genetics Algorithm

3.0 Optimize PID Controller using a Genetics Algorithm

Course Title: LabVIEW for Control System Application — Course Code: EEA 158

Course Background / Summary:

LabVIEW is one of the important SCADA software used in the industry. It provides real data monitoring and activation. LabVIEW DAQ is utilized in research and development to acquire/get respected data for further analysis. This course will introduce participants to how to utilize the LabVIEW software for control system purposes. The participants would be able to use one example of current existing DAQ and build their own Data Acquisition Card (DAQ) from scratch and communicate to LabVIEW software to control speed, position, or temperature.

Course Objectives:

- Program/Utilize LabVIEW Software or data monitoring and control.
- Make use of LabVIEW and DAQ to Control speed, position, and level system.
- Knowledge about control system PID theory and application.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians, Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to LabVIEW and DAQ

2.0 Introduction to Control System Theory

3.0 LabVIEW for Data Capture, Monitoring, Transfer, and Communication

4.0 LabVIEW Programming for Control System PID

Course Title: LabVIEW For Motor Control Application — Course Code: EEA 159

Course Background / Summary:

LabVIEW is one of the most important software being used in SCADA systems in the industry. It provides real data monitoring and activation. This course will introduce participants to how to utilize this software and build an interface circuit from scratch to communicate with LabVIEW. Upon completion, the participants would write the control algorithm in LabVIEW language and communicate with DAQ card for motor control purposes which include AC and DC machines, stepper motor, and RC servo motor.

Course Objectives:

- Write Lab view code for motor control.
- Control AC and DC, RC servo motor, and stepper motor using LabVIEW.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to DC & AC Machine, Stepper and RC Servo Motor

2.0 Introduction to Labview and DAQ

3.0 LabVIEW for Data Transfer and Communication

4.0 Introduction to PIC Microcontroller as Interface Circuit to Lab view

Course Title: LabVIEW for Pneumatics & Hydraulics Application

Course Code: EEA 160

Course Background / Summary:

Labview is one of the most important SCADA software used in the industry. It provides real data monitoring and activation. System. This course will introduce participants to how to utilize Labview software and build the interface for Pneumatics and Hydraulics applications. The participants would also be able to construct/build Data Acquisition Card (DAQ) from scratch.

Course Objectives:

- Program/Utilize LabVIEW Software and familiarize with DAQ.
- Control pneumatics and hydraulics cylinders for several applications.
- Program/Utilize LabVIEW Software for data monitoring and control.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians, Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to LabVIEW and DAQ

2.0 Introduction to PIC Microcontroller as Interface Circuit to LabVIEW

3.0 LabVIEW for Data Capture, Monitoring, Transfer, and Communication

4.0 LabVIEW Programming for Control Motors

Course Title: MATLAB/ Simulink for Control System Application — Course Code: EEA 161

Course Background / Summary:

MATLAB/ Simulink has been widely used in Engineering research environments due to the ability of the software for complex computation in several engineering fields. This course will introduce participants on how to make use of MATLAB/Simulink for solving a linear differential equation, finding transfer function, state-space equation, constructing physically-based models, and controlling the application based on its transfer function. This includes the use of system identification and the SISO tool. The study system will be speed, position, and level.

Course Objectives:

- Construct a physical-based model, state-space model, and transfer function model.
- Make use of system identification and the SISO tool for control application.
- Control the MATLAB/ Simulink model studied.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Basic Knowledge About MATLAB/ Simulink

2.0 Theory of Control System

3.0 Construct Physical Based Model, Transfer Function, State Space from Linear Differential Equation

4.0 Control Speed, Position, Level System with Aid of System Identification and SISO tool

Course Title: MATLAB/ Simulink for Hardware in Loop Application

Course Code: EEA 162

Course Background / Summary:

MATLAB/ Simulink has been widely used in Engineering research environments due to the ability of the software for complex computation in several engineering fields. This course will introduce participants to how to make use of MATLAB/Simulink for hardware in loop (HIL) applications. In hardware, in Loop, the controller lies in MATLAB/ Simulink while the control process is real-time hardware. Communication protocol will be used, and a PIC microcontroller will be the interface. The study system will be speed, position, and level.

Course Objectives:

- Construct interface circuit using PIC microcontroller.
- Write C code for communication to transfer input, and output data signals from MATLAB/ Simulink to interface and vice versa.
- Control the speed, position, level, and temperature using the HIL technique.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians, Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Basic Knowledge About MATLAB/ Simulink and HIL

2.0 Theory of Control System

3.0 Construct Interface using PIC Microcontroller for HIL Application.

4.0 Control Speed, Position, Level System with Aid of System Identification and SISO tool

Course Title: MATLAB/ Simulink for Processor in Loop Course Code: EEA 163

Course Background / Summary:

MATLAB/ Simulink has been widely used in Engineering research environments due to the ability of the software for complex computation in several engineering fields, this course will introduce participants to how to make use of MATLAB/Simulink for processors in loop (PIL) application. In the processor in Loop, the controller lies in real-time (hardware) but the system/Process is in MATLAB/ Simulink (software). Communication protocol will be used, and a PIC microcontroller will be the interface. The study system will be speed, position, and level

Course Objectives:

- Construct interface circuit using PIC microcontroller.
- Write C code for communication to transfer input, and output data signals from MATLAB/ Simulink to interface and vice versa.
- Control the speed, position, level, and temperature using the PIL technique.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Basic Knowledge about MATLAB/ Simulink and PIL

2.0 Theory of Control System

3.0 Construct Interface Circuit using PIC Microcontroller

4.0 Control Speed, Position, Level System with Aid of PIL System

Course Title: Microcontroller for Data Communication

Course Code: EEA 164

Course Background / Summary:

Data communication is an important medium for Engineering and control application when systems are complex and requires data to be transferred from one subsystem to another system. Such example is a remote system. Communication can be done through parallel and serial data communications. A microcontroller is one of the main components of data communication whereby it uses its communication features to communicate. This course will expose participants on how to use PIC microcontroller for communication through serial communication such as USART, SPI etc. The communication is done through microcontroller to microcontroller or microcontroller through PC or vice versa.

Course Objectives:

- Construct controller from scratch for data communication application.
- Control UART and SPI to allow data transfer and receive.
- Write C code algorithm to control data communication application.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians, Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Data Communication Theory

2.0 Theory on PIC Microcontroller for Data Communication

3.0 Write C Code Control Algorithm for Data Transfer and Receive

4.0 Commissioning and Testing with Oscilloscope

Course Title: Microcontroller for Pneumatics and Hydraulics Application — Course Code: EEA 165

Course Background / Summary:

A microcontroller is one of the main components in any controller applied in the industry. Complex systems are controlled with the aid of this microcontroller. This course will introduce participants to how to use a PIC microcontroller to build a controller for Pneumatics and Hydraulics applications. The control application will be inclusive of the timer, counter, system alternate, system diversion and etc.

Course Objectives:

- Construct controller from scratch for pneumatics and hydraulics application.
- Control pneumatics and hydraulics using, timer, counter, system alternate, and diversion with the constructed controller.
- Write C code algorithm to control such pneumatics and hydraulics application.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Electronic Circuit and Microcontroller

2.0 MATLAB for Communication

3.0 LabVIEW for Data Transfer and Communication

4.0 C Programming

Course Title: Microcontroller for Radio Frequency Data Communication Course Code: EEA 166

Course Background / Summary:

Data communication is an important medium for engineering and control application when systems are complex and requires data to be transferred from one subsystem to another system. Such an example is a remote system. Communication can be done through parallel and serial data communications. A microcontroller is one of the main components in data communication whereby it uses its communication features to communicate. This course will introduce participants to how to use a PIC microcontroller for Radio Frequency wireless data communication through serial communication such as USART, SPI, etc. The communication is done through the microcontroller to microcontroller or microcontroller through PC or vice versa via the wireless transmitter and receiver.

Course Objectives:

- Construct controller from scratch for data communication application.
- Control UART and SPI to allow data transfer and receive.
- Write C code algorithm to control data communication application.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians, Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Radio Frequency Theory

2.0 Introduction to Data Communication Theory

3.0 Theory on PIC Microcontroller for Data communication

4.0 Write C Code Control Algorithm for Data Transfer and Receive

5.0 Testing and Commissioning Controllers for Data Communication using Oscilloscope

Course Title: Microcontroller Control System Course Code: EEA 167

Course Background / Summary:

A microcontroller is one of the main components in any controller application in the industry. Complex systems are controlled with the aid of this microcontroller. In a control system, the microcontroller is used as a Digital PID controller for control application purposes. PIC microcontroller is one of the most popular microcontrollers nowadays. This course will introduce participants to how to build a Digital PID controller using a PIC microcontroller and write C code for PID algorithm for control system purposes such as speed, position, level, and temperature control.

Course Objectives:

- Construct PID controller from scratch.
- Control speed, position, and level system.
- Write C code control PID algorithm to control such application.

Target Audience:

- Electricians, Research assistants, Research officer, Researcher, Academicians
- Technicians & Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Control System Theory

2.0 Introduction to PIC Microcontroller

3.0 MATLAB/ Simulink for Data Transfer and Communication With The Controller

4.0 C Code Programming for PID Control Algorithm

Course Title: Neural Network With MATLAB/ Simulink for Control System Application — Course Code: EEA 168

Course Background / Summary:

Neural Network is one of the control algorithms which are gaining popularity. Its flexibility and ability of it to deal with nonlinear and complex systems make it the best option to be used. This course will introduce participants to how to make use of neural networks for the application of pattern recognition and decision making. MATLAB/ Simulink will be the tool to test the control algorithm.

Course Objectives:

- Use neural network control algorithm for pattern recognition and decision making.
- Familiarize with MATLAB/ Simulink as the processing engine for this neural network algorithm.

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians, Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Radio Frequency Theory

2.0 Basic Knowledge on MATLAB/ Simulink Introduction to Data Communication Theory

3.0 Write and use Neural Network Algorithm for Pattern Recognition and Decision Making

Course Title: Electrical Safety & Machine Safeguarding — Course Code: EEA 169

Course Background / Summary:

This course will expose the participants to the necessary requirement in protecting employees from electrical and mechanical hazards. In general, any equipment, electrical components, machine parts, function, or process which may cause injury must be safeguarded, whereby the hazard must be controlled or eliminated. Therefore, an element that will cause electrical and mechanical hazards should be addressed. This course will also bring awareness towards personal protective equipment (PPE) used to prevent electrical hazards.

Course Objectives:

- State the definition of current, voltage and ohm.
- Explain hazards related to electricity.
- Explain basic preventive measures in electrical safety.
- State the BASIC RULE(s) for all electrical work performed.
- Identify statutory requirements related to electrical safety.

Target Audience:

- Management/ Supervisory Level
- Supporting Staffs

Course Duration: 1 Day

Course Contents
1.0 Electrical Shock, Step and Touch Potential
2.0 Safe Work Practices
3.0 Power Arcs
4.0 Electrical Accidents & Emergencies
5.0 Basic Electrical Safety Rule(s)
6.0 Electrical Hazards Awareness
7.0 Electrical Safety Tips

Course Title: Electrical Engineering for Non-Electrical Engineers

Course Code: EEA 170

Course Background / Summary:

This course is designed for non-electrical professionals who work with electrical equipment. It covers fundamental electrical concepts, power systems, equipment service factors, and voltage regulation. Participants will learn about electric power bill calculations and gain an understanding of transformers, motors, and generators. Hands-on base practical sessions will be key features of this training. The practical session will give the trainee a "hands-on" feel of common electrical components which include a power circuit breaker, contactor, overload relay, ac drive, and more.

Course Objectives:

- Describe the electrical magnitudes and solve power and energy calculations.
- Identifying the electrical equipment and the components and performing wiring installation with safety consideration.
- Discuss principles and equations governing the operation and performance of transformers, electric motors, AC drive, and generators.
- Solve electric power bill calculation in the residential, commercial, and industrial arena.

Target Audience:

- Non-electrical professionals

Course Duration: 3 Days

Course Contents

1.0 DC Circuit Analysis & Basic Electronic Devices

2.0 Alternating Current (AC) Fundamentals

3.0 DC & AC Power, Power Factor

4.0 Transformers, Electric Motors & Generators

5.0 Single-phase and Three-Phase System

6.0 Electrical & Controls Drawings

Course Title: Feedback Control System — Course Code: EEA 171

Course Background / Summary:

This short course is devised for engineers to refresh their knowledge in control theory. Basic theories and definitions are introduced before aspects of modeling can be understood. Analysis and design of control systems based on time and frequency response will assist control engineers in deciding on the control platform. Before embarking on the controller, the stability of the system should be determined to ensure the control objective is achieved. For a complex system, we are bound to a multi-input and multi-output system, and this will also be introduced in the course. With the advent of computer technology either in the software or hardware, today's engineering analysis will not be without CAD, as a control engineer MATLAB package is the answer, and it is a must for complex analysis and systems.

Course Objectives:

- Construct PID controller from scratch.
- Control speed, position, and level system.
- Write C code control PID algorithm to control such application.

Target Audience:

- Electricians, Researcher, Academicians
- Technicians, Engineers , Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction: Definition, Open Loop and Closed Loop, Servo Control and Process Control

2.0 Modeling: Laplace Transform, Transfer Function, Pole and zero, Mechanical system, Electrical System, Electro-Mechanical System, System Identification

3.0 MATLAB: Basic Commands, Plot, Symbolic Analysis, Simulink

4.0 Time Response: First Order System, Second Order System, Transient Response, Steady State Response, Design using Root Locus, Stability

5.0 Frequency Response: Bode Plot, Nyquist Plot, Gain Margin and Phase Margin Determination of Transfer Function

Course Title: Industrial Communication — Course Code: EEA 172

Course Background / Summary:

This subject will introduce the essential topics of computer communications which consist of serial/parallel communications, interfaces, transmission media, data communication equipment, link control/ protocols, and error detection. It actually describes the basic communication process that takes place between computers which then forms standard industrial communications in industries. Finally, it will introduce a basic local network of computers and focus on the design and implementation of LAN within a small workgroup.

Course Objectives:

- Explain the theory of industrial communication, the pyramid of automation, and data transmission media and relate the theory with the application in manufacturing industries.
- Explain the concept, example, operating principle, and basic application of field bus technology (Device Net) in relation to industries.
- Describe the terms, terminology, characteristics communication process, protocol, architecture, topology, and basic components and functions of PC communication and networking.

Target Audience:

- Management Level/ Supervisory Level/ Supporting Staffs

Course Duration: 5 Days

Course Contents

1.0 Introduction to Industrial Communication

2.0 Fundamentals of Data Communication

3.0 Ports, Modem and Transmission Media

4.0 Ethernet Technology in Industrial Communication

Course Title: GPS Positioning with PIC Microcontroller

Course Code: EEA 173

Course Background / Summary:

The course has been designed to familiarize academicians, technicians, and engineers dealing with microcontroller configuration. The application of microcontrollers varies from small applications such as pick and place to complex systems such as satellite, GPS navigation, drone, etc.

Course Objectives:

- Understand the basic concepts of microcontroller
- Understand microcontroller configuration
- Examples and demo application of microcontroller

Target Audience:

- Academicians, Engineers, Instructors

Course Duration: 2 Days

Course Contents

1.0 The Hardware Architecture of Microcontroller

2.0 I/O Pins and its Configuration

3.0 Analog to digital

4.0 Timers

5.0 UART and SPI

6.0 Interrupts (IOC and Others)

7.0 PWM

8.0 Simple Projects using Microcontroller

Course Title: Advanced Design Systems for RF Microelectronics Course Code: EEA 174

Course Background / Summary:

The realm of RF microelectronics demands specialized knowledge and skills to design high-frequency circuits and systems that power wireless communication, radar systems, and other electronic applications. This course focuses on equipping participants with advanced techniques and methodologies required to design, simulate, and optimize RF microelectronic circuits using cutting-edge design systems and tools.

Course Objectives:

- Gain an in-depth understanding of RF microelectronics principles.
- Master advanced design techniques for RF circuits, considering factors such as noise, linearity, and interference.
- Develop proficiency in simulating and optimizing RF circuits using computer-aided design (CAD) software.
- Acquire the skills to design and analyze RF amplifiers, oscillators, mixers, and filters.
- Learn about advanced modulation schemes and their implementation in RF circuits.
- Explore electromagnetic simulation techniques for RF components and transmission lines.

Target Audience:

- Control system engineers seeking to enhance their expertise in PIL techniques.
- Embedded systems engineers interested in integrating control algorithms with processor platforms.

Course Duration: 5 Days

Course Contents

1.0 RF Microelectronics Fundamentals.

2.0 Advanced RF Circuit Design Techniques

3.0 High-Frequency Simulation and Optimization Tools

4.0 RF Amplifier Design and Optimization

5.0 RF Oscillator Design and Phase Noise Analysis

6.0 Electromagnetic Simulation for RF Components and Transmission Lines

Course Title: PLC Omron (Analog and Real Time Application) **Course Code: EEA 175**

Course Background / Summary:

This module offers two applications in PLC OMRON. Participants will be exposed to the Analog module for two types of structures: modular and compact structures. Each structure has a different method of analog connectivity. Participants will also learn the Real-time application in PLC OMRON, using the right method and addresses.

Course Objectives:

- Apply analog devices especially sensors and able to program projects based on real-time

Target Audience:

- Industrial workers from technicians to engineers
- Teaching staff (vocational & technical teachers) and lecturers

Course Duration: 3 Days

Course Contents

1.0 Data Allocation and Structure

2.0 PLC Structures: Modular and Compact Structures

3.0 PLC Modular and Compact Hardware

4.0 PLC Pre-Programming (TIMER, COUNTER, COMPARATOR)

5.0 PLC Focused Functions (MOV, MOVD, FLT, etc.)

6.0 PLC Analog Hardware Connection and Programming

7.0 PLC Real Time Programming

Course Title: Practical Signal and Image Processing: Theory & Applications **Course Code: EEA 176**

Course Background / Summary:

This course introduces participants to the theory and practical applications of signal and image processing. It covers theory, algorithms, and real-world applications for generating, transforming, and interpreting information in various formats, known as signals. Participants will gain hands-on experience in image processing tasks using programming, focusing on real-world applications like defect detection and dimensional measurement.

Course Objectives:

- Use programming language to define and manipulate scalars, vectors, and matrices.
- Use programming language to represent signals and systems.
- Write programming language to perform time-domain and frequency-domain. analysis, use a programming language to design linear filters.
- Use programming language codes to read and process digital images.
- Write programming language codes to extract features and other information from digital images.
- Develop algorithms for specialized applications.

Target Audience:

- Technical managers, scientists, engineers, technicians, teaching staffs (vocational & technical teachers)
- Lecturers, and research students who wish to learn about signal and image processing and review their implementation and applications for industry use.

Course Duration: 3 Days

Course Contents

1.0 Introduction Signal and Image Processing

2.0 Representation of Signals and Systems

3.0 Time-Domain and Frequency Domain Analysis

4.0 Filter Design etc.

5.0 Images and Spatial Transformation

6.0 Images and Spatial Transformation

7.0 Analyzing and Enhancing Images etc.

Course Title: Mechatronics System Troubleshooting

Course Code: EEA 177

Course Background / Summary:

The course focuses on the automation system which includes programmable logic controllers. It covers both theory and practical related which form the basis for automated system application. This course will provide participants with the knowledge and practical skills required for maintenance/troubleshooting techniques.

Course Objectives:

- Identify main elements in a mechatronics system
- Read, analyze and utilize the technical documents such as datasheets, timing diagrams, operation manuals, schematics, etc. for a mechatronic system
- Trace and describe the flow of energy in a given mechatronic system or subsystem.
- Carry out measurements on electrical components in a mechatronic system.
- Correctly localize, identify and document causes of malfunctions in the mechatronics system, based upon the technical documentation.

Target Audience:

- Technical personnel, engineers, technicians, teaching staff (vocational & technical teachers)
- Lecturers, and students who wish to learn about mechatronics system troubleshooting.

Course Duration: 3 Days

Course Contents

1.0 Mechatronics system overview

2.0 Mechatronics system documentation

3.0 Energy flow in mechatronics system

4.0 Basic measurement

5.0 Systematic system troubleshooting

6.0 Fault finding exercise

Course Title: Optical Proximity Sensing Technology: Basic Principles & Application in Object Detection

Course Code: EEA 178

Course Background / Summary:

This course describes optical proximity sensing principles and technology, as well as the associated specialty fiber types and components required for their system integration. A broad overview of diverse applications is made with a particular emphasis on object detection. Technical personals, trainers, and instructors who wish to widen their knowledge of optical proximity sensor technology and application.

Course Objectives:

- Become familiar with the terminology used to describe the switching performance of optical proximity sensor
- Become familiar with the response characteristic of a through-beam sensor
- Determine which materials can be detected with the sensor
- Become familiar with the range of applications and response characteristics of a retro-reflective sensor
- Become familiar with the range of applications of optical proximity switches with fiber-optic cable.
- Become familiar with the setup and function of an optical diffuse light sensor.

Target Audience:

- Technical managers, scientists, engineers, technicians, and research students who wish to learn about optical-sensing technology and review its implementation and applications for industry use.

Course Duration: 3 Days

Course Contents

1.0 Sensor Terms, Multi Sensor System, Characteristics	**4.0 Optical Proximity Sensor – Types and Types of Reflection**
2.0 Optical Proximity Sensor – Design	**5.0 Optical Proximity Sensor – Fibre-Optic Cable Layouts**
3.0 Optical Proximity Sensor – Basic Circuit Diagram	**6.0 Practical with Applications**

Course Title: PLC for Control System (with Touch Screen Panel) Course Code: EEA 179

Course Background / Summary:

Programmable Logic Controllers (PLCs) play a pivotal role in modern control systems, enabling automation, monitoring, and control of various industrial processes. Integrating a Touch Screen Panel (HMI) with a PLC adds a user-friendly interface for real-time visualization and interaction. This course provides participants with the knowledge and skills to effectively design, program, and implement PLC-based control systems with Touch Screen Panels.

Course Objectives:

- Understand the integration of Touch Screen Panels (HMIs) with PLCs in control systems.
- Master programming techniques for PLCs and HMIs, considering real-time control and user interaction.
- Design user-friendly HMI interfaces for efficient process monitoring and control.
- Learn about data exchange and communication protocols between PLCs and HMIs.
- Gain proficiency in troubleshooting and debugging PLC-HMI systems.
- Develop skills to create alarm systems, data logging, and remote access features.
- Explore advanced features of HMIs, such as trends, recipes, and security measures.

Target Audience:

- Control system engineers seeking to expand their knowledge of PLC and HMI integration.
- Automation technicians interested in designing and implementing PLC-HMI systems.
- Maintenance personnel responsible for troubleshooting and optimizing control systems.

Course Duration: 4 Days

Course Contents

1.0 Introduction to PLCs and HMIs: Principles and Significance

2.0 PLC Programming Fundamentals: Ladder Logic, Function Blocks, and Sequential Control

3.0 HMI Design Principles: Layout, Navigation, and User Interaction

4.0 PLC-HMI Communication: Data Exchange and Communication Protocols

5.0 Touch Screen Panel Integration

6.0 Real-time Monitoring and Control: PLC-HMI Interaction for Process Control

7.0 Troubleshooting and Debugging of PLC-HMI Systems

8.0 Alarm Systems and Data Logging Implementation

Course Title: Electronic Product Quality Control Course Code: EEA 180

Course Background / Summary:

Customer Satisfaction is the number one priority at Future Electronics. The Future Electronics Quality Management System (QMS) is focused on understanding customer requirements and striving for excellence in Quality, Delivery, Service, and environmental responsibility. The Worldwide Future Electronics Quality Management System is certified to ISO9001:2015 Quality Management System Requirements. This course will explain to all participants about the requirement for product quality and focus on the electronic industry.

Course Objectives:

- Understand basic quality requirement for manufacturing product
- Differentiate the quality requirement from various type of International Organization of Standard (ISO)
- Report writing skill for Non-Conforming Report (NCR)
- Preparing the sampling analysis
- Understanding related requirement such as Occupational Safety and Health (OSHA) and Department of Environmental (DOE)

Target Audience:

- Machines Operators and Suppliers, Teaching staffs (including vocational and technical teachers), Industrial workers, Trainers, Technical Teachers

Course Duration: 3 Days

Course Contents

1.0 Introduction to Quality Control and Quality Management

2.0 Manufacturing System

3.0 Statistical Process Control (SPC)

4.0 Good Manufacturer Product (GMP)

5.0 Iso9001: 2015 Quality Management System

6.0 Iso13485 Medical Device Compliance

7.0 Iso/Ts 16949 Automotive Compliance

8.0 8D Report

9.0 Inspection Method: Sampling Analysis Vs 100% Inspection

10.0 ISO 18001 Occupational Safety & Health (OSHA)

11.0 ISO 14001 Environmental Compliance

12.0 Others Related ISO Standard Such as ISO 22000 (FSSC) & Quality Environment (QE)

Course Title: Automation Handling System Course Code: EEA 181

Course Background / Summary:

In modern manufacturing and logistics industries, the demand for efficient and precise material handling has led to the widespread adoption of Automatic Handling Systems. These systems encompass a variety of technologies, including robotics, conveyors, sensors, and control systems, to automate the movement, sorting, and distribution of materials and products. This course provides participants with a comprehensive understanding of Automatic Handling Systems, their design principles, and their integration into industrial processes.

Course Objectives:

- Understand the significance of Automatic Handling Systems in modern manufacturing and logistics.
- Learn about various sensors and control mechanisms used in Automatic Handling Systems.
- Design and plan effective Automatic Handling Systems for specific industrial applications.
- Acquire skills to troubleshoot and maintain Automatic Handling Systems for optimal performance.

Target Audience:

- Automation technicians interested in designing, implementing, and maintaining material handling solutions.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Automatic Handling Systems: Importance and Applications

2.0 Principles of Material Handling Automation: Conveyors, Robots, AGVs

3.0 Sensors and Detection Mechanisms in Automatic Handling Systems

4.0 Control Strategies for Efficient Material Handling

5.0 Integration of Automatic Handling with Production Lines

6.0 Troubleshooting and Maintenance of Automated Handling Solutions

Course Title: Digital Electronics Application Course Code: EEA 184

Course Background / Summary:

This course develops digital design experience with reference to the implementation of digital systems in recognizing various number systems, Boolean algebra, Boolean expression, K-maps, logic gates, digital IC technology, combinational logic network, fundamental of sequential logic and flip-flop, counter, shift register, memory, and programmable logic devices.

Course Objectives:

- Understand CMOS as the building block for Digital Electronics
- Understand Boolean algebra, Boolean Expression, and K-Maps
- Design and implement combinational and sequential logic circuits
- Design State Machine

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 CMOS Logic gates

2.0 Combinational Logic Circuits

3.0 Flip Flops and Sequential Logic Circuit

4.0 Counters, Shift Registers and State Machines

5.0 Analogue and Digital Conversion

6.0 Laboratory Tutorial Exercise: Simulation Tools Application with Electronic Circuits

7.0 Laboratory Tutorial Exercise: Electronics Product Specification Synthesis

Course Title: Advanced Design Systems for RF Microelectronics Course Code: EEA 185

Course Background / Summary:

This course addresses the evolving challenges in RFIC design and wireless systems due to higher frequencies and advanced wireless standards. It focuses on imparting skills for setting up wireless systems in IoT and Industry 4.0. The course covers modern RF and wireless communication integrated circuits, including topics like RF design, circuit technologies, noise physics, and 4G, IoT, and 5G MIMO architectures. Participants will gain essential knowledge for designing and analyzing wireless systems in various applications.

Course Objectives:

- Apply knowledge, techniques, and skills of modern engineering tools necessary for RF and Microelectronics engineering practice to conduct experiments, analysis, and interpret data to verify and evaluate circuit behaviour for 3G, 4G, and IoT architectures for Industrial 4.0 smart industries.

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 Basic Concepts in RF Design	**6.0 Oscillators**
2.0 Transceiver Architectures	**7.0 Phase Locked Loop (PLL)**
3.0 Low Noise Amplifiers (LNA)	**8.0 Power Amplifiers (PA)**
4.0 Mixers	**9.0 Transceiver Design and Specification Examples**
5.0 Passive Devices	

Course Title: Electronic Devices and Circuits Course Code: EEA 186

Course Background / Summary:

This course introduces students to the basic electronic device's structure, configuration, and construction. The course will cover the fundamentals of electronic devices involving diodes, bipolar junction transistors, and field-effect transistors. The contents encompass devices' structure, operation, and characteristics for certain application circuits.

Course Objectives:

- Describe the basic concepts of solid-state principles from the Atomic Theory to electronic devices structure and construction.
- Interpret the function and application of diodes, bipolar junction transistor, field effect transistor and operational amplifier in electronic circuits.
- Analyse on various types of transistor configuration circuit and amplifiers circuits with revision on basic electrical and electronic laws.
- Discuss the environmental impact of disposing electronic devices into the environment without any precaution.

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 Solid-State Principles

2.0 Semiconductor Diode

3.0 Diode Circuit Applications

4.0 Bipolar Junction Transistors (BJT)

5.0 Field Effect Transistors (FET)

6.0 Operational Amplifiers (Op-Amp)

Course Title: Signal Processing and Embedded System Course Code: EEA 187

Course Background / Summary:

This course provides comprehensive lessons of both the theory and applications in signals, systems, and transforms. Students will be exposed to the mathematical background of signals and systems, including the Fourier transform the Fourier series, the Laplace transform, the discrete-time and the discrete Fourier transforms, and the z-transform.

Course Objectives:

- Describe Signal Processing system in time domain.
- Compute the Fourier series, Z-transform and the discrete time Fourier transform (DTFT) of discrete-time signals.
- Resolve the filter design and spectrum estimation using appropriate tools.
- Analyse various filters in time and frequency domains according to design requirements.

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 Introduction to Signals & Systems

2.0 Discrete-Time Signals and Systems

3.0 Z-Transform and its Applications

4.0 Fourier and Discrete Fourier Transform of Signals

5.0 Structure of Discrete Time Systems

6.0 Digital Processing of Continuous-Time Signals

7.0 Design of FIR Filters

8.0 Design of IIR Filters

Course Title: Essence of Telecommunication Course Code: EEA 188

Course Background / Summary:

This course is offered to trainees who are interested in strengthening their skills and knowledge in telecommunication systems development. It gives a broad knowledge of the fundamentals of telecommunication systems with an emphasis on analog and digital communications.

Course Objectives:

- Apply the concepts and theories in evaluating the differences in telecommunication technologies.
- Apply and solve telecommunication problems by using synthesis analysis techniques.

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 Introduction to Telecommunication

2.0 Signals in Telecommunication

3.0 Quality of Service and Telecommunication Impairments

4.0 Transmission and Switching

5.0 Voice Telephony

6.0 Transmission Transport

7.0 Data Communication

8.0 Cellular Communication Systems

Course Title: Electrical System Design — Course Code: EEA 189

Course Background / Summary:

This course is suitable for Electrical Engineers who work in consultation companies, contractors, and maintenance fields in a factory. Electrical Design has a huge demand in many segments like design, manufacture, and installation of power and distribution systems, Sub-stations Design, commercial and Domestic interior lighting

Course Objectives:

- Knowledge of the component used in Electrical Design such as MCCB, MCB, Busbar, single-phase, and three-phase system loads, etc.
- Participation should gain the steps in electrical system design, from selecting the cable size, circuit breaker size, voltage drop, etc.
- Participation also should be able to draw the schematic diagram of the Electrical System.

Target Audience:

- Managers, Engineers and Technicians

Course Duration: 3 Days

Course Contents

1.0 Electrical Components

2.0 Basic Electrical Design

3.0 Basic Electrical Design Using AutoCAD

Course Title: Custom Analog Mixed Signal VLSI Design and Verification

Course Code: EEA 190

Course Background / Summary:

In the realm of Very Large-Scale Integration (VLSI), analog mixed-signal (AMS) circuits play a critical role in enabling the functionality of modern electronic systems. Designing and verifying these complex circuits requires specialized knowledge and skills. This course delves into the intricacies of custom analog mixed-signal VLSI design and verification, providing participants with the expertise needed to develop robust and reliable AMS circuits.

Course Objectives:

- Understand the significance of custom analog mixed-signal VLSI design in modern electronics.
- Grasp the principles of AMS circuit design, considering noise, power, and performance.
- Learn about the different stages of the VLSI design flow, focusing on analog components.
- Acquire skills in using industry-standard tools for circuit simulation and layout design.
- Develop proficiency in debugging and verifying complex AMS circuits.
- Explore advanced topics such as layout parasitic, signal integrity, and design-for-testability.

Target Audience:

- Analog design engineers seeking to enhance their expertise in custom AMS VLSI design.
- VLSI designers interested in expanding their skills to include mixed-signal circuits.
- Electronics engineers involved in developing complex integrated circuits and systems.

Course Duration: 4 Days

Course Contents

1.0 Introduction to Custom Analog Mixed-Signal VLSI Design	**5.0 Layout Design**
2.0 Principles of Analog Circuit Design	**6.0 Verification Techniques**
3.0 VLSI Design Flow	**7.0 Signal Integrity and Layout Parasitic in AMS Circuits**
4.0 Circuit Simulation	**8.0 Design-for-Testability (DFT) and Test Strategies for AMS Circuits**

Course Title: The Principle of Signal Processing and Systems Course Code: EEA 191

Course Background / Summary:

In the realm of Very Large-Scale Integration (VLSI), analog mixed-signal (AMS) circuits play a critical role in enabling the functionality of modern electronic systems. Designing and verifying these complex circuits requires specialized knowledge and skills. This course delves into the intricacies of custom analog mixed-signal VLSI design and verification, providing participants with the expertise needed to develop robust and reliable AMS circuits.

Course Objectives:

- Understand the significance of signal processing and systems in various applications.
- Grasp the fundamental principles of signals, their properties, and classifications.
- Acquire skills in time-domain and frequency-domain analysis of systems.
- Explore methods for designing and analyzing linear time-invariant systems.
- Gain proficiency in applying signal processing techniques to real-world problems.

Target Audience:

- Electrical engineers seeking to enhance their understanding of signal processing and systems.
- Telecommunications professionals interested in signal analysis and manipulation.
- Audio and acoustic engineers working with sound processing and analysis.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Signal Processing and Systems: Importance and Applications

2.0 Signal Properties and Classifications: Continuous vs. Discrete, Deterministic vs. Stochastic

3.0 Signal Transformation Techniques: Fourier Transform, Laplace Transform, Z-Transform

4.0 Time-Domain Analysis of Systems: Convolution, Impulse Response, Step Response

5.0 Frequency-Domain Analysis of Systems: Frequency Response, Bode Plots

6.0 Linear Time-Invariant (LTI) Systems

Course Title: Linear Systems and Signals — Course Code: EEA 192

Course Background / Summary:

Linear systems and signals form the foundation of various engineering disciplines, including communications, control systems, and signal processing. Understanding the principles of linear systems and how they interact with signals is essential for engineers working with complex systems. This course delves into the theory and application of linear systems and signals, providing participants with the knowledge needed to analyze and manipulate signals within linear systems.

Course Objectives:

- Understand the fundamentals of linear systems and their significance in engineering applications.
- Learn techniques for analyzing linear time-invariant (LTI) systems and their behavior.
- Acquire skills in convolution, impulse response, and frequency response analysis.
- Apply Laplace and Fourier transforms for signal and system analysis.

Target Audience:

- Electrical engineers seeking to enhance their understanding of linear systems and signals.
- Control system engineers interested in analyzing system behavior and responses.
- Signal processing professionals looking to gain a strong foundation in linear systems.

Course Duration: 3 Days

Course Contents

1.0 Understand the fundamentals of linear systems and their significance in engineering applications.

2.0 Grasp the characteristics of different types of signals

3.0 Learn techniques for analyzing linear time-invariant (LTI) systems and their behavior.

4.0 Acquire skills in convolution, impulse response, and frequency response analysis.

5.0 Apply Laplace and Fourier transforms for signal and system analysis.

6.0 Develop proficiency in understanding the relationship between input signals and system outputs.

Course Title: Analog Circuit Design Fundamentals Course Code: EEA 193

Course Background / Summary:

This course is suitable for Electrical Engineers who work in consultation companies, contractors, and maintenance fields in a factory. Electrical Design has a huge demand in many segments like design, manufacture, and installation of power and distribution systems, Sub-stations Design, commercial and Domestic interior lighting

Course Objectives:

- Understand the working principle of active and passive components
- Understand the frequency response of an RLC Circuit
- Design a first order and second order passive filter
- Design a single stage and double stage amplifier

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 Basic Circuits Using passive components

2.0 Transient Response in DC circuit

3.0 Resonance in AC circuit

4.0 Passive Analog Filter

5.0 Basic Circuits Using active components

6.0 MOSFET Multistage Amplifier

7.0 Laboratory Tutorial Exercise: Simulation Tools Application

Course Title: Semiconductor Devices and Technology — Course Code: EEA 194

Course Background / Summary:

The course will provide students with a glimpse into the semiconductor industry that has brought about the technological revolution. Because of the interdisciplinary nature of the subject, its content includes concepts from electrical engineering, chemical engineering, and material science. The course outline can be divided into historical development and basic concepts, manufacturing methods and equipment, measurement methods, models and simulation, limits, and future trends in technologies and models. At the end of the course, students will be introduced to the fundamentals of conventional semiconductor devices.

Course Objectives:

- Good understanding of the various processing techniques used to fabricate integrated circuits and microstructures
- Understand theory of the individual semiconductor processes and how they are characterized
- Design and implement basic diode circuits
- Characterize a single device MOSFET

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 History of Semiconductor Technology	**5.0 Solid State Principles**
2.0 Crystal Growth, Wafer Fabrication and Basic Properties of Silicon Wafers	**6.0 Semiconductor Diode and Diode Application**
3.0 Semiconductor Manufacturing - Clean Rooms, Wafer Cleaning and Gettering	**7.0 Bipolar Junction Transistor (BJT)**
4.0 Semiconductor Process and Fabrication Technology	**8.0 Metal Oxide Semiconductor Field Effect Transistor (MOSFET)**

Course Title: Transmission Line Theory & Practise for RF and Microwave Apps

Course Code: EEA 195

Course Background / Summary:

Transmission lines are fundamental components in the realm of RF and microwave engineering, playing a crucial role in the efficient transfer of electromagnetic signals. Understanding transmission line theory and its practical applications is essential for professionals working in communication systems, radar technology, wireless networks, and more. This course provides participants with a comprehensive understanding of transmission line principles and their application in RF and microwave engineering.

Course Objectives:

- Grasp the significance of transmission line theory in RF and microwave engineering.
- Understand the behavior of electromagnetic signals in transmission lines.
- Learn techniques for impedance matching, signal integrity, and signal propagation.
- Acquire skills in designing and analyzing transmission line structures for RF and microwave applications.

Target Audience:

- RF and microwave engineers seeking to deepen their understanding of transmission line theory.
- Communication system designers interested in optimizing signal propagation and integrity.
- Antenna engineers aiming to enhance their knowledge of transmission line matching and design.

Course Duration: 3 Days

Course Contents

1.0 Importance and Applications in RF and Microwave Engineering	**4.0 Impedance Matching Techniques**
2.0 Electromagnetic Signal Behavior in Transmission Lines: Reflection	**5.0 Signal Integrity Considerations**
3.0 Transmission Line Parameters	**6.0 Transmission Line Design and Analysis**

Course Title: Modern Control Engineering — Course Code: EEA 196

Course Background / Summary:

This course introduces important concepts in the analysis and design of control systems. This course is suitable for electrical, mechanical, or chemical engineering backgrounds. The participants are expected to have basic knowledge of differential equations, Laplace Transform, vector-matrix analysis, circuit analysis, and mechanics. Control systems engineering is essential in the field of electrical, mechanical, aerospace, biomedical or chemical engineering. Control systems are found in a broad range of applications within these disciplines. The focus of this course is the practical application of analysis, tuning, and design of a feedback system.

Course Objectives:

- Analyze different types of system such as electrical, mechanical, and electromechanical using time and frequency domain approach.
- Compute mathematical model and the corresponding transfer function for Linear Time-Invariant Systems
- Design control system in frequency domain/ time domain by using suitable technique and appropriate software

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 Introduction to Control Engineering.

2.0 Modeling in the Frequency Domain.

3.0 Modeling in the Time Domain.

4.0 Feedback Control System Characteristics.

5.0 Performance of Feedback Control Systems.

6.0 Stability of Linear Feedback Systems.

Course Title: Wireless Communication System Development & Verification Course Code: EEA 197

Course Background / Summary:

This course is to provide thorough coverage of RF and Microwave transmission line applications for wireless communication concepts and theory based on fundamental principles of RF and microwave engineering. This course includes RF and microwave circuits and their devices of practical importance. The theoretical concepts include electromagnetic theory and RF and microwave waveguides specifically on the transmission line, network analysis, impedance matching, filters, oscillators, amplifiers, mixers, and antennas. This subject will be taught via practical instructions, individual practical tasks, and collaborative learning.

Course Objectives:

- Perform device characteristics analysis for RF and microwave response, signal integrity, and stability.
- Understand and apply RF and microwave transmission line analysis studies using simulation software tools.
- Familiarize with RF and microwave devices such as filter, amplifier, power divider, and antenna to meet specific performance criteria and analyze their performances.
- Work effectively in groups while performing practical tasks based on selected teamwork models.

Target Audience:

- Industrial workers from technicians to engineers, individuals who are involved in IT functions, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 4 Days

Course Contents

1.0 Introduction to Radio Frequency and Microwaves Applications	**4.0 The Smith Chart**
2.0 Transmission Lines Theory	**5.0 RF Components and Circuit**
3.0 Planar Transmission Lines	**6.0 RF Transmission Components**

Course Title: RF and Microwave Transmission Line Simulation and Analysis **Course Code: EEA 198**

Course Background / Summary:

In the realm of RF (Radio Frequency) and microwave engineering, the design and analysis of transmission lines are critical for ensuring efficient signal propagation and integrity. This course focuses on transmission line simulation and analysis, leveraging advanced tools and techniques to address the complex challenges presented by high-frequency applications.

Course Objectives:

- Understand the importance of accurate transmission line simulation and analysis in RF and microwave engineering.
- Grasp the fundamental principles of transmission lines and their behavior at high frequencies.
- Learn about various transmission line types and their applications in RF and microwave circuits.
- Acquire proficiency in using simulation software tools for transmission line analysis.

Target Audience:

- RF and microwave engineers seeking to enhance their skills in transmission line simulation and analysis.
- Communication system designers interested in optimizing signal integrity and minimizing losses.

Course Duration: 3 Days

Course Contents

1.0 Introduction to RF and Microwave Transmission Line Simulation and Analysis

2.0 Transmission Line Fundamentals: Behavior at High Frequencies

3.0 Types of Transmission Lines: Microstrip, Stripline, Coplanar Waveguide

4.0 Simulation Software Tools for Transmission Line Analysis

5.0 Impedance Matching Techniques and Signal Integrity

6.0 Loss Analysis in Transmission Lines: Dielectric and Conductor Losses

Course Title: Introduction to Writing Verilog Codes — Course Code: EEA 199

Course Background / Summary:

Verilog is a Hardware Description Language; a textual format for describing electronic circuits and systems. It is most commonly used in the design and verification of digital circuits at the register-transfer level of abstraction. It is also used in the verification of analog circuits and mixed-signal circuits, as well as in the design of genetic circuits. Applied to electronic design, Verilog is intended to be used for verification through simulation, timing analysis, test analysis (testability analysis and fault grading), and logic synthesis. Learning Verilog is not that hard if you have some programming background.

Course Objectives:

- Translate a basic schematic logic circuit into Verilog codes and vice versa
- Write a hierarchical Verilog code for combinational circuits
- Solve a basic design problem using Verilog codes

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 3 Days

Course Contents

1.0 Basic Understanding of Design Process

2.0 Design Entry using Verilog

3.0 Writing Test bench for Verilog Codes

4.0 Hierarchical Verilog Codes

5.0 Verilog for Combinational Circuit

6.0 Verilog for Arithmetic Circuit

7.0 Design Examples

Course Title: Fundamentals of Electrical and Electronic — Course Code: EEA 201

Course Background / Summary:

This course introduces the basic electrical circuits that encompass the SI Units, elements in an electrical circuit, and how to apply Ohm's Law and Kirchhoff's Law in electrical circuits. Participants will be exposed to analysis methods in the resistive circuits and alternating circuits. They will also be taught the energy storage elements and the general form solutions for the first-order circuits, and techniques of DC and AC circuit analysis.

Course Objectives:

- Describe the concepts of electricity/electronic (s) and the basic electrical components used in the electrical field
- Solve DC and AC circuit analysis computations for series, parallel, and combination circuits by using selected laws used in the electrical field.

Target Audience:

- Industrial workers from technicians to engineers, etc.
- Teaching staff (vocational & technical teachers), lecturers, etc.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Electrical & Electronics Technology

2.0 DC Circuits

3.0 AC Circuits

Course Title: Power Electronics: Design, Simulate & Analysis using MATLAB Course Code: EEA 202

Course Background / Summary:

The MATLAB simulation platform (by MathWorks, Inc.) offers a versatile and robust option in the design and simulation of power electronic converter systems. This course uses a practically oriented approach. This approach can help participants to learn the essential concepts of power electronics through MATLAB® examples and simulations easily. In-depth, the course will cover a detailed explanation of power electronics devices such as diac, thyristors, power MOSFET, and IGBT. Here's what you'll learn from hands-on sessions.

Course Objectives:

- Simulate and Analysis the power electronics device using MATLAB
- Designing and validating three basic topologies used in switching power supplies are a buck, also known as forward, boost, and buck-boost
- Design, simulate, and compare digital controller architectures for power conversion topologies
- Analysing system response to faults and abnormal conditions.

Target Audience:

- Electricians, Academicians, Technicians, Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Introduction to Power Electronics

2.0 MATLAB Simulation of Power Electronics Devices

3.0 Controlled Rectifier using MATLAB

4.0 DC Chopper using MATLAB

5.0 Inverter using MATLAB

6.0 Application of power electronics project using MATLAB

Course Title: Fundamentals of VLSI Design and Verification Phase 2 — Course Code: EEA 203

Course Background / Summary:

Topics covered are basic concepts in RF design, scattering parameters, modern integrated circuit technologies, fundamental limitations of the speed of operation of transistors, physics of noise, and impedance matching requirements for the main components of RF Transceiver such as low-noise amplifiers, mixers, oscillators, phase noise, and phase-locked loops.

Course Objectives:

- The objective of this training is to present the concepts of design and analysis of modern RF and wireless communication integrated circuits that cover a wide range of applications including high-speed wireless communications.

Target Audience:

- Anyone interested in gaining a solid knowledge of the key elements of industrial automation to improve their work skills and to further their job prospects:

Course Duration: 10 Days

Course Contents

1.0 Basic Concepts in RF Design

2.0 Transceiver Architectures

3.0 Low Noise Amplifier Design (LNA)

Course Title: Autonomous System — Course Code: EEA 204

Course Background / Summary:

The course is developed to upgrade the knowledge and skills of using robot operating systems (ROS). ROS is an open-source robotics framework for writing robot software, built from the ground up to encourage collaborative robotics software development. ROS contains a vast array of tools, libraries, and conventions that help simplify the task of creating complex robots across a wide variety of robotic platforms. With the availability of ROS for the Internet of Things (IoT), users can incorporate advanced capabilities such as computer vision and machine learning on their robot applications. In the rise of the IR4.0 era, digital factories needed to use an autonomous robot as a solution to enable the interconnectivity of machines, processes, and products on the factory floor.

Course Objectives:

- Basic concept to practical robot application programming!
- ROS Basic concept, instructions, and tools
- How to use sensor and actuator packages on ROS
- Embedded board for ROS: OpenCR1.0
- SLAM & Navigation with TurtleBot3
- Simulation using MoveIt and Gazebo
- Smart Factory by using Autonomous Mobile Robots

Target Audience:

- Engineers, Technical Staffs, Industry Workers

Course Duration: 4 Days

Course Contents

1.0 Getting Started

2.0 Robot Operating System

3.0 SLAM, Navigation and Manipulation

4.0 TurtleBot3 Applications

Course Title: System Integration — Course Code: EEA 205

Course Background / Summary:

The course will cover the practical integration of individual pieces of automation and various levels of electrical control to create stand-alone automated fabrication and assembly systems. The participant will integrate a variety of manufacturing equipment to create, program, and operate an Automated Handling Systems (MAP) and Flexible Manufacturing System (FMS). At the end of the course, the participants will be able to perform and be familiarized with the automated workstation including the usage of hardware and software. It also covers the description and techniques used for industrial equipment and maintenance jobs.

Course Objectives:

- Identify the fundamentals of System Integration such as Automated Handling Systems (MAP) and Flexible Manufacturing Systems (FMS) properly.
- Prepare the operations of PLC programming to operate the systems.
- To explain the operation of the automation system and to assess performance.

Target Audience:

- Machines Operators and Suppliers
- Teaching staff (including vocational and technical teachers), Technical Teachers
- Industrial workers

Course Duration: 4 Days

Course Contents

1.0 Introduction to System Integration

2.0 Automation Control: PLC and Installation

3.0 Flexible Manufacturing System: FMS-200 and MAP-200

Course Title: Automotive Diagnostics Using Scanner Tools — Course Code: EEA 206

Course Background / Summary:

Successful diagnosis depends on using the same process for all problems and customer concerns to arrive at the root cause of the problem. Many different things can cause an engine performance problem or concern. All problem diagnosis deals with symptoms that could be the result of many different causes. The wide range of possible solutions must be narrowed to the most likely and these must eventually be further narrowed to the actual cause. The process of finding errors/symptoms of a problem can be expedited by using scanner tools.

Course Objectives:

- Discuss the type of scan tools that are used to assess vehicle components.
- Describe diagnostic trouble code retrieval, diagnosis, and testing for OBD-II vehicles.
- Able to perform diagnosis in an automotive system using scanner tool and rectify faults in light vehicle systems.

Target Audience:

- Engineers, Fresh Graduates, Industrial Workers, Retirees, Automotive Hobbyist

Course Duration: 3 Days

Course Contents

1.0 Diagnostic Techniques

2.0 Tools and Types of Equipment

3.0 Onboard diagnostics

Course Title: PCB Design and Fabrication — Course Code: EEA 207

Course Background / Summary:

A printed circuit board (PCB) is a flat plate or base of insulating materials that contain a pattern of conducting material and components, and some projects can be quite complex. But all PCBs have to start somewhere — and that's with design. Proteus Professional is a software combination of the ISIS schematic capture program and ARES PCB layout program. This is a powerful and integrated development environment. Tools in this suit are very easy to use and these tools are very useful in education and professional PCB designing. As professional PCB designing software with integrated space-based auto-router, it provides features such as fully featured schematic capture, highly configurable design rules, interactive SPICE circuit simulator, extensive support for power planes, industry-standard CADCAM & ODB++ output, and integrated 3D viewer.

Course Objectives:

- Apply Schematic design process techniques using appropriate software
- Develop PCB circuit using appropriate software and generate the Gerber files

Target Audience:

- Educators, Engineers, IOT Analytics, Fresh Graduates, Industrial Workers

Course Duration: 3 Days

Course Contents

1.0 Introduction to Proteus

2.0 Schematic Design (ISIS)

3.0 PCB Layout (ARES)

4.0 Output Files (Gerber, BOM, Pick and Place)

Course Title: Basic 3D Scanner — Course Code: EEA 208

Course Background / Summary:

3D scanning technology has revolutionized various industries, including manufacturing, design, architecture, and healthcare. Understanding the basics of 3D scanning is essential for professionals seeking to capture real-world objects and environments in digital form. This course provides participants with an introduction to the principles, methods, and applications of basic 3D scanning technology.

Course Objectives:

- Understand the significance of 3D scanning in modern industries and applications.
- Grasp the fundamental principles of 3D scanning technologies and techniques.
- Learn about different types of 3D scanners and their working principles.
- Acquire skills in setting up and operating basic 3D scanning equipment.
- Develop proficiency in capturing 3D data and creating digital models.

Target Audience:

- Architects interested in digitizing physical spaces for design and renovation projects.
- Industrial designers aiming to create digital prototypes from real-world objects.
- Surveyors and geospatial professionals looking to enhance their data collection techniques.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Basic 3D Scanning: Importance and Applications

2.0 Principles of 3D Scanning Technologies: Laser, Structured Light, Photogrammetry

3.0 Types of 3D Scanners: Handheld, Tripod-Mounted, and Fixed Scanners

4.0 Operating and Setting Up Basic 3D Scanning Equipment

5.0 Data Capture and Point Cloud Generation

6.0 Meshing and Creating Digital 3D Models

Course Title: Practical on Data Acquisition Using NI-DAQ and LabVIEW

Course Code: EEA 210

Course Background / Summary:

You will learn the principles of data acquisition using sensors, NI data acquisition hardware, and LabVIEW in the course Data Acquisition Using NI-DAQ and LabVIEW. The cornerstone of sensor connectivity, including grounding and wiring configurations, as well as the fundamentals of hardware selection, including resolution and sample rate, are covered in the first section of this course. The NI-DAQ driver is used to measure, create, and synchronize data acquisition operations in the second part of this course. Along with scripting finite and continuous acquisitions, you'll learn about timing, triggering, and logging best practices for hardware and software. You will gain practical experience with NI-DAQ and LabVIEW to configure and programme NI data acquisition hardware in this course.

Course Objectives:

- Develop integrated, high-performance data acquisition systems that produce accurate measurements.
- Acquire data from sensors, such as thermocouples, using NI data acquisition hardware.
- Apply advanced understanding of LabVIEW and the NI-DAQ to create applications.
- Eliminate measurement errors due to aliasing and incorrect signal grounding.
- Initiate measurements using hardware and software triggering.
- Acquire and generate single-point and buffered analogue waveforms.
- Acquire and generate digital signals.

Target Audience:

- Educators, Engineers, Graduates, Industrial Workers

Course Duration: 2 Days

Course Contents

1.0 LabVIEW

2.0 Temperature measurement using LabView

3.0 DC motor control system

Course Title: Basic Electrical & Electronics Troubleshooting — Course Code: EEA 211

Course Background / Summary:

Professionals involved in manufacturing, assembly, and maintenance. Machinists, trainers, and technicians who wish to widen their knowledge of basic electricity and electronics troubleshooting.

Course Objectives:

- Differentiate electrical magnitudes and measure electrical and electronic circuits.
- Perform measurement using Multimeter and oscilloscopes
- Differentiate control, regulation, and protection components.
- Assemble electrical circuits from a given diagram.
- Perform power and control circuits on electrical automation with an asynchronous three-phase motor.
- Interpret the electric diagram of an automation machine.
- Perform troubleshooting on automation machine.

Target Audience:

- Technicians involved in the manufacturing, assembly, and maintenance of automation systems.

Course Duration: Min: 3 Days, Max: 5 Days

Course Contents

1.0 Basic electricity: Unit & symbol, power supplies	**6.0 Electric components and circuits for signal processing**
2.0 Basic electronic	**7.0 Electrical protection elements**
3.0 Electronic components – RLC, diode	**8.0 Troubleshooting Techniques**
4.0 Measurement – Multimeter, Oscilloscope	**9.0 Troubleshooting Control Pilot Devices**
5.0 Electric components of signal input, Signaling elements	**10.0 Troubleshooting Electric Motor**

Course Title: Algorithm for Optimization of Engineering Process with MATLAB/ Simulink

Course Code: EEA 212

Course Background / Summary:

Genetics algorithm is one of the best tools for optimization. This course will introduce participants to how to make use of genetic algorithms for optimizing the PID gain and torque and current in parallel mode drive of four quadrants DC chopper.

Course Objectives:

- Use Genetics algorithm to optimize control application such as tuning PID controller
- Familiarize with MATLAB/Simulink as the processing engine for this Genetics Algorithm

Target Audience:

- Electricians, Research assistants, Research officers, Researchers, Academicians
- Technicians, Hobbyist
- Engineers & Instructors

Course Duration: 3 Days

Course Contents

1.0 Basic Theory for Genetics Algorithm

2.0 Basic Knowledge of Matlab/Simulink and Genetics Algorithm Optimize PID Controller using a Genetics Algorithm

Course Title: Photovoltaic Systems for Automotive

Course Code: EEA 213

Course Background / Summary:

As the automotive industry undergoes a transformative shift towards sustainable technologies, Photovoltaic (PV) Systems have emerged as a crucial component in enhancing vehicle efficiency and reducing environmental impact. Harnessing solar energy to power automotive systems not only reduces reliance on traditional fuels but also contributes to a greener and more sustainable transportation ecosystem.

Course Objectives:

- Provide comprehensive insights into the integration of Photovoltaic Systems in automotive design and functionality.
- Equip participants with the knowledge to optimize solar energy utilization for enhanced vehicle performance.
- Explore the latest advancements in PV technology and their application in the automotive sector.
- Foster an understanding of the environmental and economic benefits of PV-powered vehicles.

Target Audience:

- Automotive engineers and designers seeking to incorporate PV systems into their vehicle prototypes.
- Researchers and students aiming to deepen their understanding of Photovoltaic Systems in the context of automotive applications.

Course Duration: 3 Days

Course Contents

1.0 Introduction to Photovoltaic Systems for Automotive

2.0 Fundamentals of Photovoltaic Technology

3.0 PV System Components and Integration

4.0 Optimizing Solar Energy for Vehicle Efficiency

5.0 Building and testing small-scale PV system

6.0 Emerging technologies in PV and their potential impact on automotive design

Course Title: IOT for Mechatronics — Course Code: EEA 214

Course Background / Summary:

In the rapidly evolving field of Mechatronics, the fusion of Internet of Things (IoT) technologies has become a game-changer. This integration enhances the functionality and connectivity of mechatronic systems, paving the way for smart, interconnected devices. As industries embrace the era of Industry 4.0, understanding the synergy between IoT and Mechatronics is paramount for professionals seeking to innovate in automation, robotics, and intelligent control systems.

Course Objectives:

- Provide a comprehensive understanding of the intersection between IoT and Mechatronics.
- Equip participants with the skills to design and implement IoT solutions in mechatronic applications.
- Foster hands-on experience in integrating sensors, actuators, and communication protocols for smart mechatronic systems.
- Empower participants to develop innovative solutions for Industry 4.0 challenges.

Target Audience:

- Mechatronics engineers and professionals
- Automation and robotics enthusiasts seeking to explore the potential of IoT in their projects.

Course Duration: 3 Days

Course Contents

1.0 Introduction to IoT and Mechatronics

2.0 Fundamentals of Mechatronic Systems

3.0 IoT Architecture and Protocols

4.0 Sensors and Actuators in IoT

5.0 Designing a Smart Mechatronic System