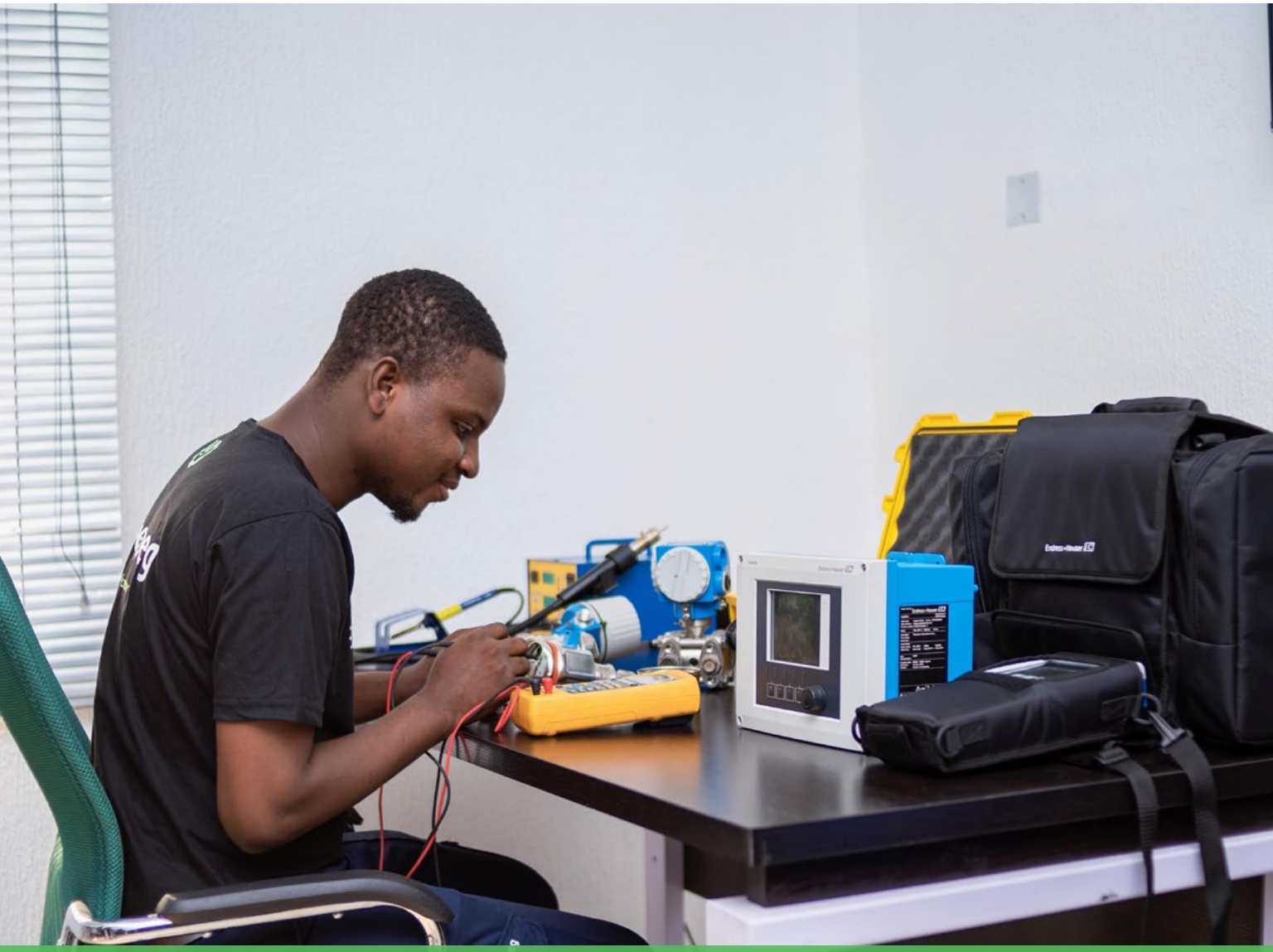
GACA

greenpegacademy.com



TRAINING BROCHURE

greenpegacademy.com

about us

Greenpeg Engineering is a leading industrial procurement, distribution and service company in Nigeria.

Our services cut across industries such as Food & Beverages, Oil & Gas, and Primaries (mining, metals, cement) Power & Energy, Water & Wastewater, Life Sciences, Pulp & Paper and even Renewable Energy industries.

Greenpeg Academy aim at bridging the skill gap between the young Engineers, starters, intermediates and Professional in order to maximize plant yields and extend plant life.

We remain dedicated to providing our customers with quality products and outstanding customer service.

We started out in 2009 as a mainly engineering procurement company but had to venture into engineering service support when we observed the challenges our customers are facing in such areas as installation, commissioning, modification and instrument verification.

Corporate Summary

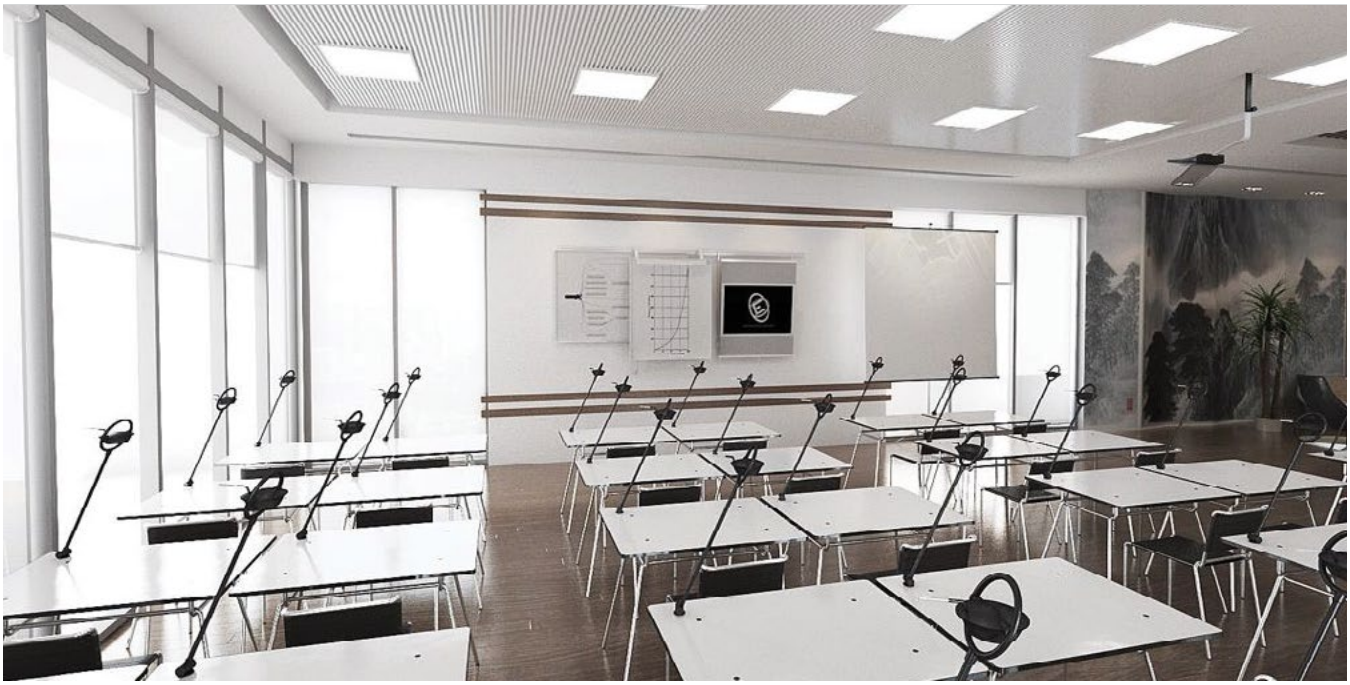
Greenpeg training capabilities are but not limited to the following areas;

- Industrial/Process Automation - PLC/SCADA/HMI (Process monitoring Applications)
- Instrumentation- Instrument design, Instrument Verification, Calibration, Instrument power gas skids,
- Metering skids and Certification with more focus on E+ H Instruments.
- Electrical- Electrical Design, Electrical troubleshooting and repair, testing, power systemsanalysis, power quality e.t.c
- Mechanical – Piping and equipment modelling, Pumps (Rotary pumps, Diaphragm, Screw Pumps), Compressors,
- Vent scrubbers, Closed drain skids, Pipes, Fittings, Flanges, Stainless steel inserts e.t.c
- Operation and Maintenance- Preventive Maintenance Services, Fire & Gas Systems, Plant testing,
- start-up and commissioning, Plant Maintenance with back to back assignments
- Personnel and Manpower Supply

Area of Activity

- FMCG – Breweries, Food processing, manufacturing etc.
- Upstream Production facilities: Offshore, Onshore, Swamp
- Power Sector - Generation, Transmission and Distribution
- Downstream Oil Sector – Storage Tank farms, Refineries, Oil
- Terminals, Petrochemical plants, etc.
- Midstream & pipelines – LPGs, Gas Plants, LNGs, CNGs etc.

Introduction



At Greenpeg Academy, we aim at bridging this knowledge gaps with emphasis on hands-on vendor- neutral technical principles.

Since we also practice what we teach as a systems integrator/ Automation service provider, we bring to bear our wealth of field experience to relate with our attendees.

Over the years, we have trained, groomed and nurtured, with support from our OEM partners, a team of highly skilled, innovative and professional engineers.

Our courses have been carefully selected by qualified instructor with vast experience across diverse industries to meet the field requirement of today's Engineers, technicians and supervisors.

Why Greenpeg Academy?

From our feedbacks through previous similar training classes, attendees prefer Greenpeg for but not limited to the following reasons:

1. Greenpeg has extensive on-the-job working experience in the industry. These experiences will be applied inhe execution of all our training.
2. We design courses and take feedback from industry experts to ensure our courses meet and exceed the aim and objectives of the training.
3. Our trainers have extensive multi-industry working experience (Oil & Gas, Manufacturing, Mining, Power, Water, etc) and are frequently re-certified on a yearly basis by our OEMs
4. Our training courses are available all year round!
5. Our training courses are application driven! We take real case studies even if its complex.
6. We have 24/7 feedback system and we act immediately to your concerns.
7. Trainings can be customized to your organization's need.
8. We mentor and support our trainees to resolve issues even after their training.
9. Our training courses are available on-site and off-site to suite our customers need.
10. Our rates are competitive.

Training Methodology

Greenpeg adopt different methodology depending on the nature of participation. We strongly believe that training methods must suite the objective and profiles of the learner.

- We help corporate bodies to derive a detailed learning method to ensure right skill generation in workforce and we do provide skill assessment reports to stakeholder to ensure better deployment of human resource.
- We customize courses as per need of the client to ensure 100% productivity from client.
- We apply different approach for individual learners to enhance their employability and retention.

Our Training in 3 Categories:

1	2	3
Fundamental Skills	**Professional Field Engineer**	**Special Skills**

Each category has sessions with well-equipped labs for practical/ hands-on.

The Professional courses build on strong fundamental skills to impact application driven knowledge under various topics at an advanced stage. The Special skill courses are focused on needs of particular industries and operations.

We adopt but not limited to the following approach:

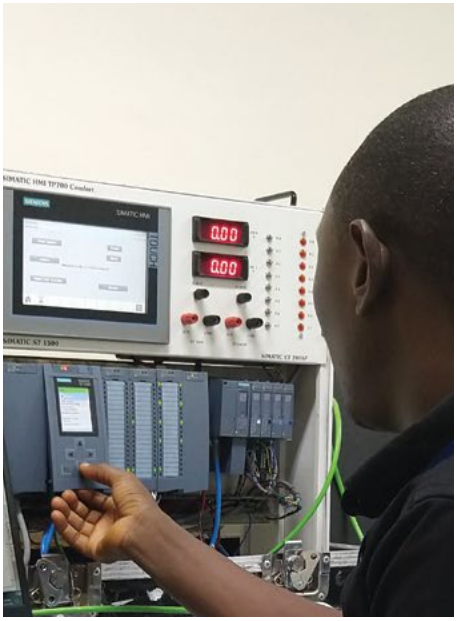
Assessment:
We carry out this test in order to evaluate the technical depth/ knowledge of our participants in any of the courses enrolled without any form of study preparation and in a highly constrained time as to discovering their knowledge gaps in the course of the training.

Theory:
This part of the training will equip the trainees/ participants with theoretical information.

The instructions will be intertwined with periodic assessments in order to continually evaluate the assimilation of facts and the acquisition of knowledge. This training will be conducted by seasoned professionals with varied experiences in instrumentation and automation. A rigorous documentation regime will be followed for the progress monitoring and knowledge/skills acquisition recording.

Hands-on:
As earlier highlighted, we give 75% hands- on for Public (simulated) and Corporate (on the job Training) to our trainee/participants. Lectures and group discussion are also highly interactive and encouraged to bridge the gap of understanding/assimilation by trainees/participants for knowledge and experience transfer.

Registration Procedure



1. Download and complete the registration form from our website at www.greenpegacademy.com or contact academy@greenpegltd.com for a copy.

2. Payment: Cash, cheque deposit and on-line transfer of the exact course fee are to be made to Greenpeg. Academy account as indicated on the registration form.

3. After the step 2, Send the scanned copy of the payment teller and the completed registration form to:
academy@greenpegltd.com for registration and payment confirmation

4. The registration process must be completed latest 2 weeks before training commencement date.

5. Joining instruction will be sent to your email latest within 24hours before the commencement of the training.
All further communication and enquiries can be made through:
academy@greenpegltd.com

Tuition & Tuition refund Policy

Payment made covers the facility, training materials, tea and lunch break for the duration of the training. All other expenses, including lodging and transportation, are the responsibility of the student.

Any Cancellation requests must be communicated via Greenpeg academy official email. The following charges will apply:

Notice in Working Days	% of course fee payable
10	100%
5- 9	80%
3 - 4	50%
0 - 2	40%

Notice period commences from the time Greenpeg Academy administra- tion receives written confirmation.
Substitutions will be accepted at any time for confirmed course places at no additional charge.

Cancellation of a Course By Greenpeg Engineering

Greenpeg reserves the right to cancel a course, subject to written notice to confirmed participants not later than 5 working days prior to the course start date. In such event a full refund of fees already paid will be made.

Greenpeg further reserves the right to cancel a course at any time where circumstances beyond its reasonable control make this necessary. When a course cannot be held or completed due to reasons beyond Greenpeg reasonable control, Greenpeg will endeavour to reschedule or complete the course within a reasonable period.

In the event of this not being possible a full refund of fees already paid will be made. Greenpeg shall not be liable for any loss of any nature suffered or incurred by the customer or its trainees as a result of course cancellation.

SIEMENS

Industrial Training Courses

ST-Serv 1: Simatic S7 Service and Maintenance (Course 1)

Overview:

This course introduces the customer to a Siemens S7-300 and 400 automation systems. Participants will build skills on commissioning and troubleshooting PLC.

Students will learn how to navigate STEP7 software, use the built-in diagnostics tools and perform basic program modifications. The course format is a combination of instruction and hands-on exercises.

A realistic industrial process is used for demonstrations and participant exercises. Exercises allow students to practice tasks such as testing, debugging and using diagnostic tools.

Course Content:

- SIMATIC S7 System Family overview
- Installation and maintenance of a PLC
- The SIMATIC Manager software package
- Hardware configuration
- Hardware commissioning
- Block architecture and Program Editors
- Symbols
- Binary Operations
- Digital Operations
- Introduction to Profibus DP
- Program documenting, saving, archiving and retrieving
- Basic Troubleshooting.

Participants Pre-requirements:

A basic ability to use a Windows PC, keyboard and mouse to open and close programs, locate files, drag, drop, copy and paste objects. A basic understanding of electrical components such as switches and solenoids would be very useful.

Notes:

Completion of this course satisfies part of the examination entry requirements for the Siemens Certified Service Technicia Levels 1 and 2.

This training course is not appropriate for trainees using S7-200, S7-1200 or S7-1500 based systems.

Course Benefits:

- Identify the components and performance characteristics of the SIMATIC S7-300/400 PLC
- Install a PLC system, including the communication cabling and wiring of I/O.
- Use the various address types to edit, reload, structure and run a program. Document, test, and basically troubleshoot the control system and its program.
- Diagnose and repair simple hardware problems.
- Utilize binary operations, timers, counters, comparators, and arithmetic operations for program modifications.
- Use the diagnostics buffer tools to resolve plant related issues.

Duration:

5 Days

ST-Serv 2: Simatic S7 Service and Maintenance (Course 2)

Overview:

This course is for SIMATIC S7-300-400 PLC users with basic SIMATIC control system knowledge who install or maintain automation systems and their application programs. Participants will use STEP7 software tools to build new features, diagnostics and communications into the application project. Program development using organization blocks, system functions, function blocks and data blocks along with analogue signal processing are included.

The course uses a 'hands-on' practical approach to reinforce the theoretical aspects of the training. Practical tasks are undertaken using a simulation rig and S7-300 PLC. Students will use test, debug and diagnostic tools to complete the commissioning, programming and system integration exercises.

Target Group:

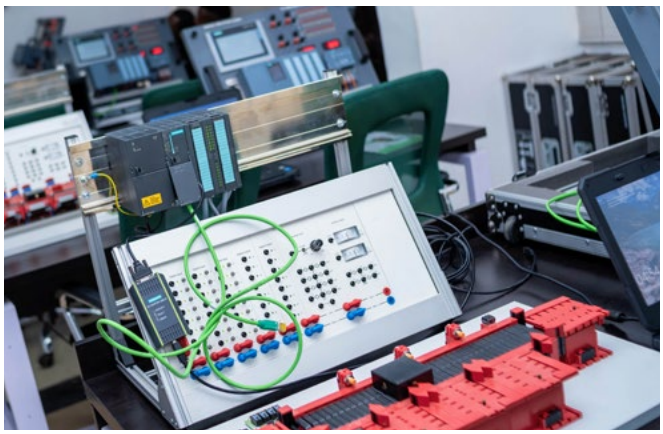
This course is aimed at service/maintenance personnel who are interested in solving a variety of SIMATIC S7 tasks and have attended the S7SERV1 course.

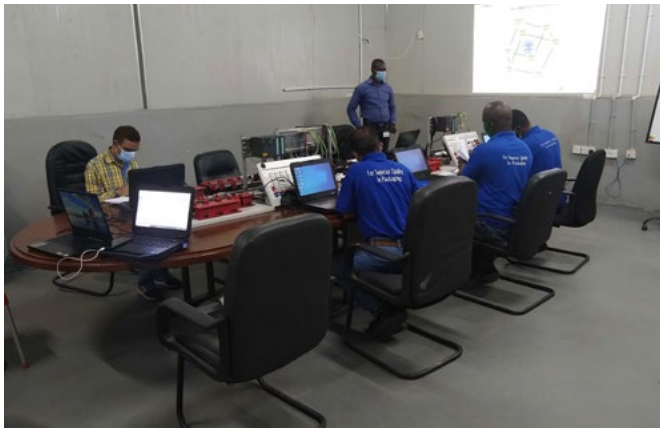
Participants Pre-requirements:

The ability to use a MS Windows PC, keyboard and mouse to include opening and closing programs, locating files, copy and paste objects/data (text, etc). Drag and drop files, objects/data (text, etc). Use of menus and multi-menus, manipulation of windows within a multi-window environment. Use of MS Windows Help. Must have attended the Siemens ST-SERV1 Course.

Course Content:

- Recap on Hardware and Software Commissioning
- Data Storage in Blocks
- Functions and function blocks
- Organization Blocks
- Analogue processing and programming
- System information
- MPI Network Commissioning
- Each of the above topic areas
- Uploading and downloading
- Program Documenting, saving, Archiving, Retrieving.
- Diagnosing faults using software and hardware (machine) diagrams.
- Each of the above topic areas backed up by practical exercises using simulator. Working examples are provided and tested out during the course.





Course Benefits:

On completion of this course the participant will:

- Be familiar with ways you can use different block types (FC, FB, OB, and DB).
- Have more understanding on the principles of analogue value processing.
- Be able to eliminate software errors that lead to a CPU stop. Understand how to eliminate logical software errors, such as multiple assignments.
- Have an understanding of how to Save and document program changes that have been made.
- Be able to use the data block access functions.
- Know how to access and use the processed analogue values.

Duration:

5 Days

ST-Pro 1: Simatic S7 Programming (Course 1)

Overview:

This course is primarily aimed at personnel who program other vendors PLCs and are looking to migrate their skills onto the S7 CPU.

It is also particularly suitable for service staff, with a firm foundation of existing PLC skills and practical experience, whose role requires them to carry out programming related tasks.

In addition, the course helps those who want a greater appreciation in program design, editing and configuration changes in an Integrated Automation environment.

Course Content:

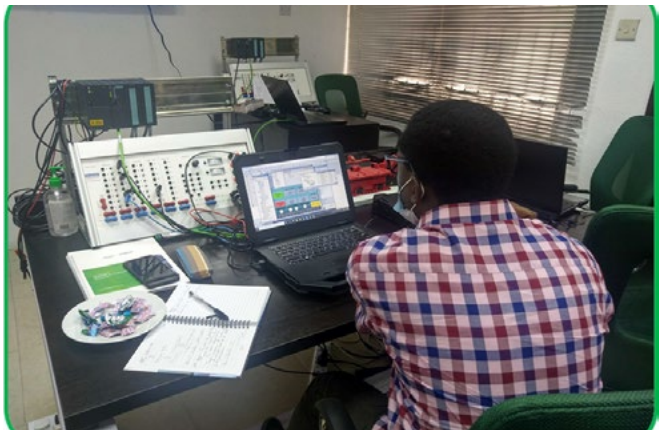
- Introduction to the S7 family of controllers and concepts of TIA
- Project creation and operation using Simatic Manager
- Hardware configuration of S7 300/400 systems
- Application and use of the Symbol Editor
- Programming using the LAD/STL/FBD Editor
- Binary operations - N/O, N/C, Set, Reset, edge detection
- Digital operations - Accumulators, timers, counters, comparators
- Tools for troubleshooting and debugging
- Introduction to Profibus DP
- Configuration and application example
- Storing process Data in Data blocks
- The role of functions and function blocks
- Configuration and application of organisation blocks
- Analogue value processing
- Documentation facilities including archive & retrieve options
- Each of the above topic areas are backed up by practical exercises using a simulator. Working examples are provided and tested out during the course.

Target Group:

This course is primarily aimed at personnel who program other vendors PLCs and are looking to migrate their skills onto the S7 CPU. It is also particularly suitable for service staff, with a firm foundation of existing PLC skills and practical experience, whose role requires them to carry out programming related tasks.

Participants Pre-requirements:

The ability to use a MS Windows PC (2000/XP), keyboard and mouse to include opening and closing programs, locating files,



copy and paste objects /data (text, etc). Drag and drop files, objects/data (text, etc). Use of menus and multi-menus, manipulation of windows within a multi-window environment. Use of MS Windows Help.

A prior knowledge and practical experience of PLCs is essential.

Notes:

Completion of this course satisfies part of the examination entry requirements for the Siemens Certified S7 Programmer.
This training course is not appropriate for trainees using S7-200, S7-1200 or S7-1500 based systems.

Course Benefits:

Among others, the participant will be able to write programs and diagnose errors using S7 software package on S7-300/400 PLC's

ST-Pro 2: Simatic S7 Programming (Course 2)

Overview:

This course is directed at personnel engaged in project engineering tasks who would like to become familiar with the extended programming possibilities of SIMATIC S7 (300/400).

After the course, the participant will be able to structure and create advanced S7 programs, making it possible to efficiently work with STEP 7 V5.5 and thus reduce the engineering phase. The course uses a 'hands-on' practical approach to reinforce the theoretical aspects of the training.

Course Content:

- Using structograms as a method for program design
- Functions, function blocks and multi-instances (with examples using IEC Timer/Counter)
- Jump commands and Accumulator operations
- Configuration of Breakpoints as a debugging tool
- Memory Indirect addressing
- Using Error organization blocks to evaluate Profibus slave downtime
- Error management with error organisation blocks
- Analysing synchronous errors with organisation blocks
- Analysing S7 diagnostic data
- Writing user messages in the Diagnostic Buffer
- Each of the above topic areas are backed up by practical exercises using a system model, consisting of the S7- 300 automation system. Working examples are provided and tested out during the course.

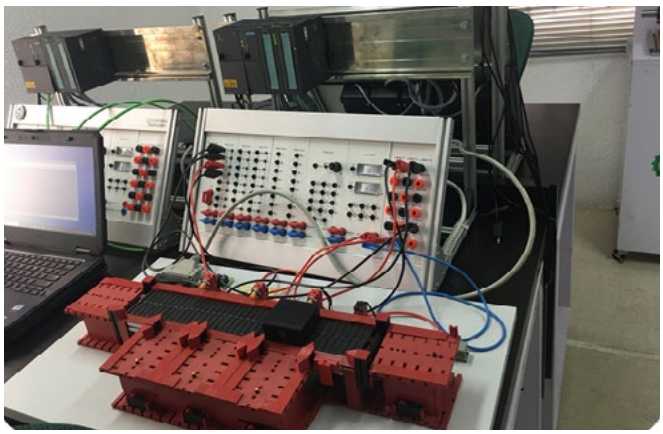
Target Group:

This course is directed at personnel engaged in project engineering tasks who would like to become familiar with the extended programming possibilities of SIMATIC S7 (300/400).

Participants Pre-requirements:

- The ability to use MS packages, Windows PC, keyboard and mouse to include opening and closing programs, locating files, copy and paste objects/data (text, etc). Drag and drop files, objects/data (text, etc). Use of menus and multi-menus, manipulation of windows within a multi-window environment.

- Must have attended the Siemens ST-PRO1 Course or have had practical exposure to programming in a project environment.



Notes:

- Completion of this course satisfies part of the examination entry requirements for the Siemens Certified S7 Programmer.
- This training course is not appropriate for trainees using S7-200, S7-1200 or S7-1500 based systems.

Course Benefits:

Among others: -

- Participants will be able to write advanced programs, use program breakpoints to test the operation of the program and diagnose errors using the Step7 V5.6 software package on S7-300 or S7-400 PLC's.

Duration:

5 Days

Tia-Micro1: Simatic S7-1200 (Basic)

GACA

Overview:

This course is aimed at engineering personnel who program, install or maintain automation systems and their application programs.

This course introduces the participant to the Siemens 1200 PLC hardware and software and will build skills on programming, installation, commissioning and basic fault diagnostics, utilizing a HMI and PLC, PROFINET communications network. Participants will learn to navigate S7 1200 software by creating a basic control program and use of the built-in diagnostics tools.

The course format is a combination of instruction and hands-on exercises. A realistic conveyor model is used for demonstrations and practical exercises. These exercises allow participants to practice tasks such as testing, debugging and using basic diagnostic tools.

Course Content:

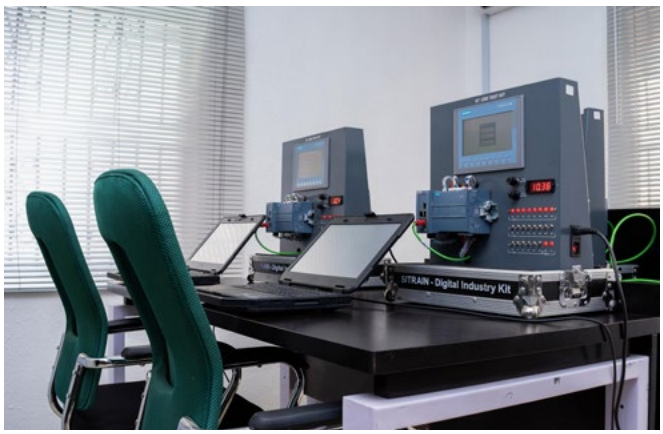
- SIMATIC S7 System Family overview
- Installation and maintenance of a PLC
- The SIMATIC Manager software package
- Hardware configuration
- Hardware commissioning
- Block architecture and Program Editors
- Symbols
- Binary and Digital Operations including IEC Timers and Counters
- Introduction to Data Blocks
- Introduction to HMI and Profinet networking
- PLC and HMI tags
- Program documenting, saving and archiving
- Each of the above topic areas are backed up by practical exercises using a conveyor model and simulator. Working examples are provided and tested out during the course.

Target Group:

This course is directed at Commissioning engineers, Engineering personnel, Maintenance personnel, Service personnel, etc.

Participants Pre-requirements:

- Basic knowledge of automation technology.



Course Benefits:

After attending this course, you can do the following:

- Understand the fundamentals of the interaction of the SIMATIC S7-1200 with an operator control and monitoring device.
- Reliably operate the "TIA Portal" engineering platform.
- Create, change, and expand small STEP 7 programs.
- Configure, parameterize, and exchange SIMATIC S7-1200 modules
- Diagnose and fix simple hardware faults using the wiring test
- Diagnose and fix simple program errors using the status block.
- Perform simple commissioning of the SIMATIC S7-1200.

Duration:

5 Days

Tia-Micro1: Simatic S7-1200 (Advanced)

GACA

Overview:

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrate engineering with SIMATIC STEP 7 Basic and SIMATIC WinCC Basic. The second part of the SIMATIC S7-1200 training is based on the knowledge of the TIA Portal gained in the SIMATIC S7-1200 basic course, including SIMATIC STEP 7 Basic and HMI.

You will expand your knowledge of programming in SCL, use of the TIA Portal diagnostic tools for clearing hardware faults and software errors, and PROFINET IO.

You will also learn about the technology functions of the PID controller and drive functions that are offered by the SIMATIC S7-1200. You will thus be able to adapt your plant to new demands.

Course Content:

- Recap of S7 1200 hardware components and TIA Portal instructions
- Set up SIMATIC S7-1200 PROFINET IO networks.
- Understand the interaction of TIA components.
- Perform specific commissioning of TIA components.
- HMI and Profinet networking
- PLC and HMI tags
- Use the PID controller technology functions and drive functions of the SIMATIC S7-1200.
- Systematically diagnose and correct hardware and software errors in the SIMATIC S7-1200 automation system with the diagnostic tools of the TIA Portal engineering portal.
- Create simple and complex programs in the programming languages LAD, FBD, and SCL
- Saving and documentation of the implemented program changes with the TIA Portal

Target Group:

This course is directed at Commissioning engineers, Engineering personnel, Maintenance personnel, Service personnel, etc.

Participants Pre-requirements:

- Completion of SIMATIC S7-1200 Basic course.

Course Benefits:

On completion of this course the participant will be able to:

- Identify the components and performance characteristics of the SIMATIC S7-1200 PLC.
- Install a PLC system, including the HMI and communication cabling.
- Use the various address types to edit, reload, structure and run a program. Document, test, and basically troubleshoot the control system and its program.Configure, parameterize, and exchange SIMATIC S7-1200 modules
- Understand and create binary operations, timers, counters etc.
- Interface an HMI with the PLC control system.
- Configure a Profinet communication network

Duration:

5 Days

TIA-Serv1: TIA Portal Service (Course 1)

Overview:

In this first part of the SIMATIC TIA Portal service training, we teach you the handling of the TIA Portal, basic knowledge about the structure of the SIMATIC S7 automation system, configuration and parameterization of hardware, and the basics of programming.

Participants will also be introduced an overview of HMI, PROFINET IO / PROFIBUS.

Course Content:

- Overview and significant performance characteristics of the SIMATIC S7 system family
- The components of the TIA Portal: STEP 7, WinCC, communication
- Program execution in automation systems
- Binary and digital operations
- Setup and assembly of the automation system
- Addressing and wiring the signal modules
- Hardware and software commissioning of the SIMATIC S7 automation system with the TIA Portal.
- SIMATIC S7 hardware configuration and parameterisation
- Presentation of a Touch panel
- Setup and parameterisation of PROFINET IO system with Touch Panel.
- Saving and documentation of the implemented program changes with the TIA Portal
- Deeper understanding of contents through practical exercises on TIA system model

Participants Pre-requirements:

Basic knowledge of automation technology

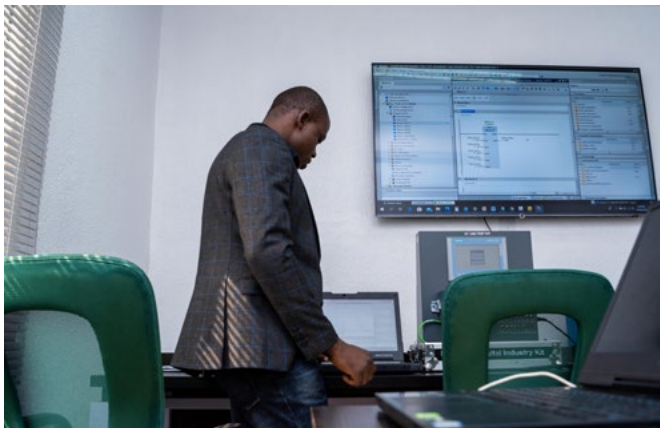
Notes:

This training course is not appropriate for trainees using S7-200, S7-300 or S7-400 based systems. This course is also suitable for those using S7-1200 based systems.

Course Benefits:

On completion of this course the participant will be able to do the following:

- Understand the fundamentals of interaction of the TIA components



- Reliably operate the "TIA Portal" engineering platform
- Understand, change, and expand small STEP 7 programs
- Configure, parameterize, and exchange SIMATIC S7 modules
- Diagnose and fix simple hardware faults using the wiring test
- Diagnose and fix simple program errors using the status block
- Perform simple commissioning of TIA components
- Participants will be capable to reduce downtimes in their plants.

Duration:

5 Days

TIA-Serv2: TIA Portal Service (Course 2)

Overview:

This second part of the SIMATIC TIA Portal service training is based on the knowledge of the TIA Portal gained in the SIMATIC TIA Portal service 1 course, including SIMATIC STEP 7, HMI, and PROFINET IO / PROFIBUS.

You will expand your troubleshooting and error correction knowledge using the TIA Portal diagnostic tool in the commissioning and productive phase. Alarms are displayed on an operator control and monitoring system.

You will implement a sequence control and integrate the analog value processing. You will thus be able to adapt your plant to new demands and to reduce downtime. You can deepen your theoretical knowledge with numerous practical exercises on a TIA system model.

Course Content:

- Hardware diagnostic functions of the TIA Portal in the SIMATIC S7 automation system
- Software diagnostic functions of the TIA Portal in the SIMATIC S7 automation system
- Possible applications of various block types (function (FC), function block (FB), organisation block (OB), data block (DB))
- Principles of analog value processing
- Commissioning of distributed I/O on PROFINET IO
- Alarm configuration in WinCC
- Parameterization of the drive
- Deeper understanding of contents through practical exercises on TIA system model

Participants Pre-requirements:

SIMATIC S7 knowledge equivalent to the Siemens TIA-SERV1.

Note:

This training course is not appropriate for trainees using S7-200 based systems.

Course Benefits:

On completion of this course the participant will be able to do the following:

- Understand the interaction of TIA components
- Understand, adapt, and expand given STEP 7 programs, including with step sequences and analog value processing.
- Systematically diagnose and correct hardware and software errors in the SIMATIC S7 automation system with the diagnostic tools of the TIA Portal engineering portal
- Perform specific commissioning of TIA components
- Adapt your WinCC configuration to new requirements through small modifications

Duration:

5 Days

TIA-Pro1: TIA Portal Programming (Course 1)

Overview:

The Totally Integrated Automation Portal (TIA Portal) forms the work environment for integrated engineering with SIMATIC STEP 7 and SIMATIC WinCC. In this first part of the SIMATIC TIA Portal programming training, we teach you the handling of the TIA Portal, basic knowledge about the structure of the SIMATIC S7 automation system, configuration and parameterization of hardware, and the basics of standard PLC programming.

Participants would also be exposed to an overview of HMI and PROFINET IO.

Course Content:

- Overview and significant performance characteristics of the SIMATIC S7 system family
- The components of the TIA Portal: STEP 7, WinCC, communication
- Program execution in automation systems
- STEP 7 block types and program structuring
- Binary and digital operations
- Programming of parameterizable blocks
- Data management with data blocks
- Programming organisational blocks
- Test tools for system information, troubleshooting and diagnostics
- Hardware configuration and parameterisation of the SIMATIC S7-1500 modules, and a Touch Panel.
- Program documentation and saving
- Deeper understanding of contents through practical exercises on TIA system model

Participants Pre-requirements:

SIMATIC S7 knowledge equivalent to the Siemens TIA-SERV1.

Notes:

This course is suitable for those using S7-1200 and S7-1500 based systems.

Course Benefits:

On completion of this course the participant will be able to do the following:

- Understand the interaction of TIA components
- Understand, adapt, and expand given STEP 7 programs.
- Systematically diagnose and correct hardware and software errors in the SIMATIC S7 automation system with the diagnostic tools of the TIA Portal engineering portal
- Perform specific commissioning of TIA components

Duration:

5 Days

TIA-Pro2: TIA Portal Programming (Course 2)

Overview:

The second part of the SIMATIC TIA Portal programming training is based on the knowledge of the TIA Portal gained in the SIMATIC S7 TIA Portal programming 1 course (TIA-PRO1). You will expand your knowledge of complex operations in statement lists (STL). Along with analog value processing and data administration with complex data types, the evaluation and handling of program-related errors are also considered.

Course Content:

» Tools for program creation (e.g. structograms)
» Analogue value processing
» Functions, function blocks, and multi-instances using the IEC-compliant timer/counter as an example (International Electrotechnical Commission)
» Jump commands
» Indirect addressing
» Classical software error handling and evaluation with error organisation blocks (OBs)
» Evaluation of diagnostic data
» Introduction to HMI device (Touch panel)
» Introduction to Statement lists (STL)
» Deeper understanding of contents through practical exercises on TIA system model.

Target Group:

This course is directed at personnel engaged in project engineering tasks who would like to become familiar with the extended programming possibilities of SIMATIC S7 (300/400).

Participants Pre-requirements:

SIMATIC S7 knowledge equivalent to the Siemens TIA-PRO1 course.

Note:

This course is suitable for those using mainly S7-1500 and/or S7-1200 based systems.

Course Benefits:

» On completion of this course the participant will be able to do the following:
» Understand the interaction of the TIA components
» Apply classical program development methods
» Solve comprehensive programming tasks

» Implement data administration with the SIMATIC S7 automation system
» Apply system blocks along with blocks from the standard STEP 7 library
» Understand the fundamental differences between optimised access and non-optimised block access
» Program software error handling and evaluation.

Duration:

5 Days

Greenpeg Automation Courses

GPA-1: Basics of Industrial Automation and Control

Overview:

This course is aimed at critical blend of knowledge and skills, covering technology in control and Automation especially for engineering and technical students in higher institution as well as fresh graduates and those are new to the field of automation and control. The class training will be complemented by class workshops, discussion on industry best practices and other reference materials.

Training for:

Students in higher institution (universities, technical schools etc) Fresh Graduates, New Recruit Engineers, and Personnel involved in design, installation, operation and maintenance of Monitoring, Automation and control systems.

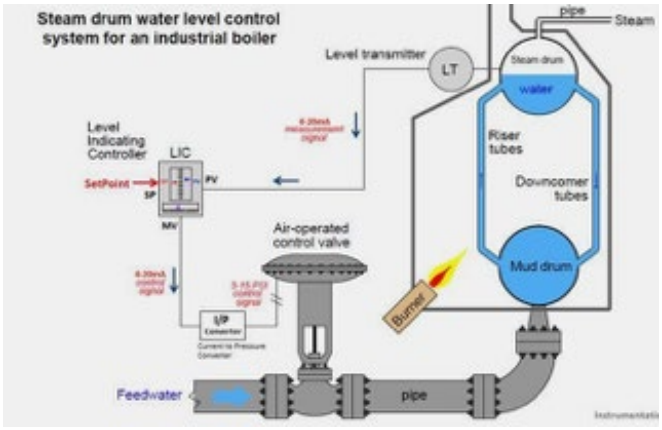
Course Content:

- Introduction to Industrial Automation and Control
- Architecture of Industrial Automation Systems
- Evolution of Control System: RLC/PLC/HMI/SCADA/DCS.
- Electrical Basics
- Control system design basics (close loop & open loop)
- Architecture of PLC based control system; CPU, PSU, I/Os and other modules
- Working with field devices and connections: sensors, drives, actuators etc
- PLC Communication and connections

- PLC Configuration & Programming
  - Component selection
  - I/O Configuration
  - Sample Project development
    - ☑ Algorithm, Flowchart & Boolean Truth table
    - ☑ State & Timing Diagram

- Basic instructions: NC, NO, OTE, OTL, OTU, Timers,
- Counters, Comparator etc.
- Program uploading & downloading

- Industrial System Applications Examples
  - Beverage production system application.
  - Traffic Light Control system application.



Course Benefits:

At the end of the course, participants will be able to:

- Understand Hierarchical Structure of Automation and Control Systems
- Identify Sensor, Set point, Comparator and Final control element
- Identify and explain the advantages of a programmable logic control over the conventional controls;
- Make a simple program in ladder diagram and statement list programming;
- Translate a ladder diagram program into electrical and logic circuits equivalent;
- Solve problem exercises and simulate controls
- Observe safe practices in dealing with PLC controls systems.
- Be part of Greenpeg Academy Alumini with technical benefits.

Duration:

3 Days

GPA-2: ROCKWELL MICROLOGIX / SLC 500 PLC PROGRAMMING & MAINTENANCE (Level 1)

Overview:

This course provides an overall exposure to the technology of Industrial Automation and Control as widely seen in factories of all types both for discrete and continuous manufacturing.

It is designed to equip beginners with no prior PLC programming experience with the basic tools necessary to create a complete PLC program using ladder logic common to most current platforms.

The focus shall be on the use of all Micrologix and SLC family using RSlogix 500 platform. The training will be complemented by class workshops, discussion on industry best practices and other reference materials.

Training for:

Personnel involved in design, installation, operation & maintenance of Automation and control systems..

Course Content:

- Introduction to Allen Bradley Range of PLC
- PLC Setup and Configuration
- CPU, Digital Inputs, Digital Outputs, Analog input and analog output
  - Types of memory – RAM, ROM, EEPROM, Memory Cassettes '
  - Basic PLC wiring, Power & Digital Inputs and Digital outputs
  - PLC operation modes and cycle
  - I/O Addressing technique: Addressing and Device Number Systems
  - Introduction to PLC programming languages
- LAD, STL & FBD and SFC; Introduction to IEC 1131 standard
  - Programming methods, the Software and Cables required
  - Introduction to RSlogix 500 Programming Software
  - Creating and configuring a project
  - Basic Ladder Instructions XIC, XIO and OTE
- Getting to Know Your Processor Online
  - Downloading to the Processor
  - Going Online
  - Processor Modes
  - Program File Online Monitoring
  - Data File Online Monitoring
  - Project Organization
- Adding More than Basic Logic
  - Programming with Symbols
  - Branches
  - Adding Motor Seal-in Circuit

  - Add Latches (OTL, OTU)
  - Timers and Counters
    - ☑ Introduction to Timers and Counters
    - ☑ TON, CTU and RES
  - Introduction to Addition and Subtraction
    - ☑ Add and Subtract with Registers
    - ☑ Add and Subtract with Registers and Constants
  - Compare Commands
    - ☑ GTR, GEQ, LES, LEQ, EQU, NEQ
- Program download and Upload
- Diagnosing faults using software and hardware (machine) diagrams
- Hand-on practical exercises & simulations.

Course Benefits:

At the end of the course, participants will be able to:

- Understand principles of operations, maintenance techniques, basic troubleshooting techniques and thorough understanding of overall machine design concepts using PLCs.
- Identify and explain the advantages of a programmable logic control over the conventional controls;
- Operate programmable logic controller;
- Identify and describe the functions of the system components of a programmable logic control;
- Make a simple program in ladder diagram and statement list programming;
- Translate a ladder diagram program into electrical and logic circuits equivalent;
- Solve problem exercises and simulate controls

Duration:

4 Days

GPA-3: ROCKWELL MICROLOGIX / SLC 500 PLC Programming & Maintenance (Level 2)

Overview:

This Rockwell level 2 Course will compliment on the contents covered on level 1 course. It will deepen the attendee's knowledge of RSLogix500 with respect to SLC500 and Micrologix hardware.

The course covers IO configuration, data files, communication with RSLinx, routines and advanced instructions etc.

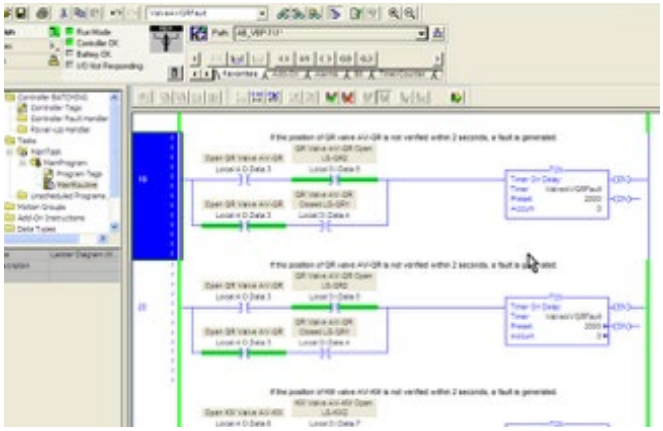
The training will be complemented by class workshops, discussion on industry best practices and other
reference materials.

Training for:

Personnel involved in design, installation, operation & maintenance of Automation and control systems.

Course Content:

- Recap of Rockwell Automation Range of PLC's and their configuration using RSlogix 500
- Overview of Rslogix 5000/Studio 5000 environment.
- Recap on basic bit Instruction
- Advanced Math Instructions
  - Square Root
  - Compute/Math Tab Negate
  - Other Compute/Math Functions
  - Trig Functions Tab
  - Fahrenheit to Centigrade Conversion
- Advanced Timer and Counter
  - Retentive Timers
  - Time off Delay
  - Count Down Timer)
- Advanced Comparison Instructions
  - Limit Test
  - Masked Equal
- Analog Programming
  - Scale with Parameters (SCP)
- File Operations
  - File Fill
  - Copy File
- Processor Faults
  - Causing and Clearing Faults
  - Preventing Faults
- Indirect Addressing
  - Indirect Addressing Faults
  - Preventing Indirect Addressing Faults



- Advanced Instructions
  - Shift Registers
  - Sequencer
  - Labels and Jumps
  - Move

Course Benefits:

At the end of the course, participants will be able to:

- Understand principles of operations, maintenance techniques, basic troubleshooting techniques and thorough understanding of overall machine design concepts using SLC 5 / Micrologix PLCs.
- Identify, Configure and describe the functions of the system components of a programmable logic control.
- Troubleshoot different SLC 5 / Micrologix control system

Duration:

3 Days

GPA-4: Rockwell Controllogix / Compactlogix PLC Programming & Maintenance (Level 1)

Overview:

This training is structured to blend and expand the knowledge of participants with initial working knowledge / familiarization with Micrologix and SLC control systems on PAC Automation systems(CompactLogix, Controllogix).

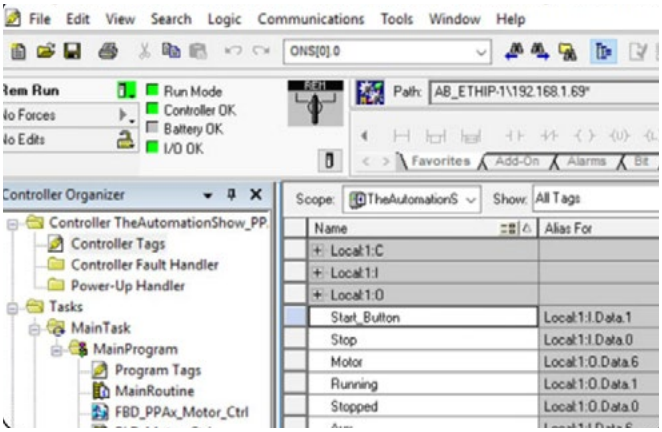
This is a skill-building course that provides you with the resources and handson practice required to develop a Studio 5000 Logix Designer® project and program basic ladder logic instructions for any Logix5000™ controller .

Training for:

This course is intended for personnel's who need to maintain and troubleshoot a ControlLogix system but have no current working experience with RSLogix5000 systems.

Course Content:

- Locating Control System Components
- Creating and Modifying a Project
- Organizing Project
- Connecting a Computer to a Communication Network
- Downloading and Going Online
- Communicating with Local and Remote I/O Modulel
- Updating Logix5000 Firmware
- Starting a Ladder Diagram
- Creating tags and Monitoring Data
- Entering Ladder Logic Components
- Organizing Arrays
- Selecting Basic Ladd
- Programming Move Instructions
- Programming Compare and Math Instructions
- Documenting and Searching Ladder Logic
- Configuring Produce/Consume
- Messaging
- Configuring Controllers to Share Date over an EtherNet/IP Network
- Configuring a Message Instructions
- Developing an Add-On Instruction
- Testing a Ladder Diagram
- Handling a Major Fault
- Importing Logix Designer Components
- Optional: Understanding Control Systems
- Optional: Managing Logix Designer Project Files.



Course Benefits:

At the end of the course, participants will be able to:

- Understand principles of operations, maintenance techniques, basic troubleshooting techniques and thorough understanding of overall machine design concepts using PAC systems.
- Create a new program Using RSLogix 5000 / Studio 5000.
- Edit existing programs and professionally document any changes made.
- Observe safe practices in dealing with PLC controls systems.
- Perform advance troubleshooting and maintenance services through the understanding of overall machine design concepts using PAC systems.
- Be part of Greenpeg Academy alumni with technical benefits.

Duration:

4 Days

GPA-5: Rockwell Controllogix / Compactlogix PLC Programming & Maintenance (Level 2)

Overview:

This training is structured to expand and expand the knowledge of participants with initial working knowledge/familiarization with PAC Automation systems (CompactLogix, Controllogix).

The student will be introduced to system hardware and programming using RSlogix 5000/Studio 5000 software.

Training for:

Individuals who need to maintain and troubleshoot a ControlLogix or other Logix5000™ system should attend this course.

Course Content:

- Optional Locating: ControlLogix System Components
- Connecting a Computer to a Network
- Interpreting Project Organization and Execution
- Locating and Editing Tag Values
- Interpreting Frequently Used Instructions
- Interpreting Arrays
- Interpreting Tags of User-Defined Data Types
- Searching for Project Components
- Integrated Practice-Interpreting a Basic Project
- Forcing I/O and Toggling Bits
- Troubleshooting Digital and Analog I/O Module Problems
- Troubleshooting Remote I/O Problems
- Updating Logix5000 Firmware
- Troubleshooting Controller Problems
- Analyzing and Troubleshooting a System

Course Benefits:

At the end of the course, participants will be able to:

- Understand principles of operations, maintenance techniques, basic troubleshooting techniques and thorough understanding of overall machine design concepts using Controllogix / Compact Logix PLCs.
- Identify, Configure and describe the functions of the system components of a programmable logic control;
- Identify, Configure and describe the functions of the system components of a programmable logic control;
- Troubleshoot different Contrologix/ Compact Logix control system

Duration:

4 Days

GPA-6: Siemens PLC Programming & Maintenance (Course 1)

GACA

Overview:

The most used guiding force behind an automated industrial plant is a programmable logic controller (PLC). PLC along with some other field devices like sensors, motors, actuators, valves, conveyors, boilers & many more, makes a real automated manufacturing plant.

The main objective of this training is to make aspiring engineers acquainted with conceptuals as well as practical knowledge of the Siemens Industrial Automation & latest technologies being used. The training also introduces the principles of operations, maintenance techniques, basic troubleshooting techniques and thorough understanding of overall machine design concepts using Siemens S7 300 and 400 PLCs.

Training for:

Personnel involved in design, installation, operation & maintenance of Monitoring, Automation and control systems

Course Content:

- Introduction to Siemen PLC's family
- PLC Architecture
  - Power Supply (PS)
  - Central Processing Unit
  - Modules: Signal Module (Input and output modules) & Special modules and peripheral device
- PLC operation modes and cycle
- Overview of Simatic Step 7 Software
  - Lunching Simatic Manager Software
  - PG/PC interface set-up
  - Hardware configuration
- Addressing technique:
  - Numbering Systems
  - Symbolic and Absolute Addressing
- Introduction to PLC programming languages
- LAD, STL & FBD; according to IEC 1131 standard
- Creating and configuring a project
- Programming structure
  - Basic instructions (NO, NC, Coil e.t.c)
  - Other instructions: SR, RS, positive and negative edge detection, Timers & Counters, Comparators e.t.c
- Connecting PLC with field devices
- Uploading, downloading, archiving and retrieving of Program files
- Diagnosing faults using software and hardware systems
- Hand-on practical on different industrial applications.

Course Benefits:

At the end of the course, participants will be able to:

- Identify and explain the advantages of a programmable logic control over the conventional controls;
- Operate Siemens programmable logic controller;
- Identify and describe the functions of the system components of a programmable logic control;
- Make a simple program in LAD, STL & FBD languages.
- Translate a ladder diagram program into electrical and logic circuits equivalent;
- Hand-on practical on different industrial applications.
- Observe safe practices in dealing with PLC controls systems.
- Be part of Greenpeg Academy Alumni with technical benefits.

Duration:

4 Days

GPA-7: Siemens PLC Programming & Maintenance (Course 2)

Overview:

This course based on Siemens S7-300 PLC and is for technicians and engineers as well for students who have previously attended a Siemens basic PLC training course and wish to expand their skills and knowledge of PLC programming, fault finding and maintenance.

The course is hands on with great emphasis on the practical aspects of Programmable Logic Controller applications. The course is based around Siemens Step 7-300 and S7-400 range of PLCs and Step 7 software and may be customized to include functions relevant to your control applications.

Training for:

Personnel involved in design, installation, operation & maintenance of Monitoring, Automation and control systems

Course Content:

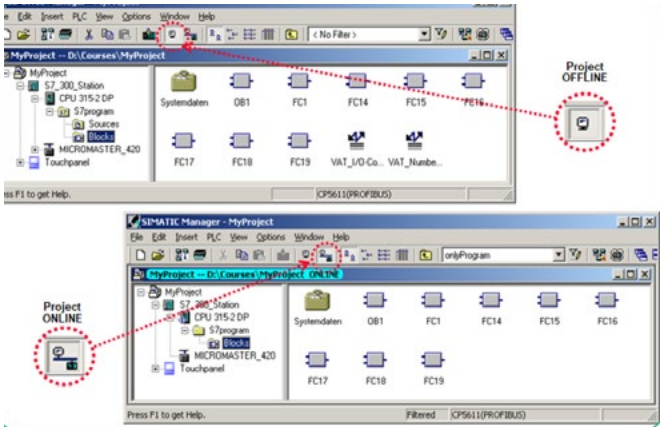
- Recap of Siemens S7 Basic course
- Extended S7 Basic communication
- Configuring Hardware
- Symbols
- Memory Concepts
- PLC Simulator
- Recap of LAD, STL & FBD programs

- Intermediate Instruction Set
  - Jump Instructions
  - Accumulator functions
  - Mathematical functions

- Analog Programming
- Advanced CPU Settings

- S7 Blocks concept and programming
  - Functions,Function Blocks, Data Blocks
  - Special Organization Blocks
  - System Function Blocks
  - System Functions

- Editing existing programs
- Uploading, downloading, archiving and retrieving of Program files



- Working with EPROMs and MMC Memory Cards
- Advance Fault diagnostics using software and hardware systems
- Hand-on practical on different industrial applications.

Course Benefits:

- Create a new and modify advance program using Simatic Step 7.
- Program using basic and advance instructions.
- Observe safe practices in dealing with PLC controls systems.
- Perform advance troubleshooting and maintenance services through the understanding of overall machine design concepts using automation systems.
- Be part of Greenpeg Academy alumni with technical benefits.

Duration:

5 Days

GPA-8: HMI/SCADA Fundamentals Using Aveva Wonderware Intouch

Overview:

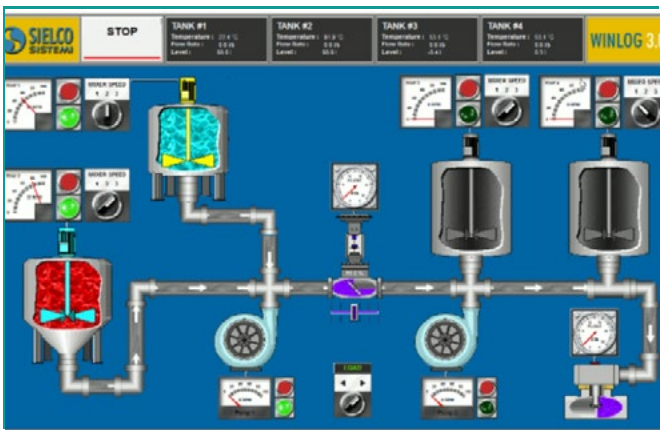
The InTouch Software - Comprehensive class is a 5-day instructor-led class that provides lectures and hands-on labs designed to teach a fundamental understanding of the basic principles of InTouch software. The purpose of this course is to give you the knowledge necessary to develop a Human Machine Interface (HMI) system for your specific plant floor environment using basic elements of the Wonderware visualization module.

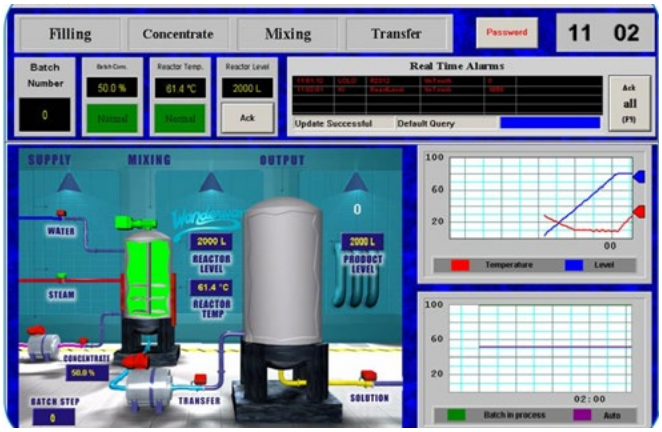
Training for:

Operators, system administrators, system integrators, and other individuals who need to use the InTouch HMI software in manufacturing processes.

Course Content:

- » Introduction
  - > General Introduction to the course
  - > Introduction to InTouch Applications
- » Development Environment
  - > Introduction
  - > Using Window Maker
- » Tagname Dictionary
  - > Tags and Tag Features
  - > Animation Links Overview
  - > Animating Objects
- » InTouch QuickScripts
  - > QuickScript Types
  - > Working with the Script Editor
  - > QuickScripts – Quick Reference
- » Alarms
  - > Alarms and Events
  - > The Distributed Alarm Object
- » Real-time and Historical Trending
  - > Real-time Trends
  - > Historical Trends
- » I/O Communication
  - > I/O Communication Protocols
  - > Wonderware I/O Servers
  - > Troubleshooting I/O
- » Miscellaneous
  - > DBDump and DBLoad
  - > Optimizing the Tagname Dictionary
- » Security
  - > Security Models





- » Build a tag-based Managed InTouch application
- » Use WindowMaker to create and configure windows
- » Use Tagname Dictionary to create and Import tags
- » Build, customize, embed, and animate symbols
- » Create QuickScripts

Prerequisites:

- » Basic computer knowledge
- » Background in control and automation

Duration:

5 Days

GPA-9: HMI/SCADA Development Using SiemensWinCC Flexible Software

Overview:

This course provides trainees with the knowledge and skills necessary to successfully design and build a WinCC flexible application. It is aimed at personnel getting their first experience of WinCC HMI software.

In this training program, participants will learn the fundamentals of SCADA systems and design considerations. It begins with an introduction of the software, teaching the student to launch, navigate, create and make use of toolbars.

Students will get to know the application, gather data, plan the tag database and design graphic screens, plan alarms and gain information that is required to operate the system.

Training for:

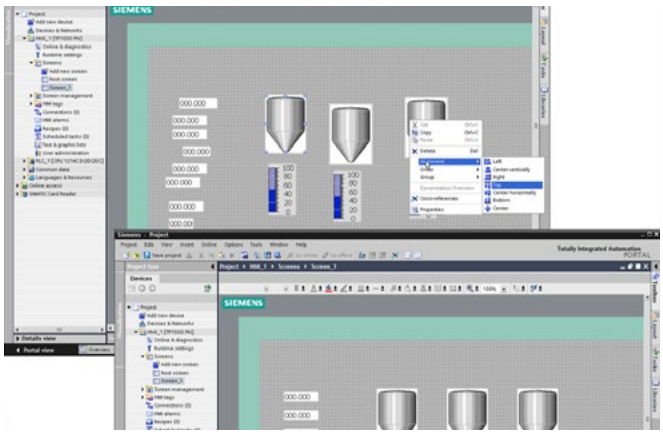
Service and Maintenance Engineers, Automation Engineers/ Technicians, personnel with responsibilities to operate or manage SCADA/HMI Systems and people who will be developing or operating a new or existing systems.

Course Content:

- Software Overview
- Planning an HMI Project
- Communications
- The Tag Dictionary
- Creating Windows
- Basic Drawing Tools
- Wizards
- Animation Links
- Recipes
- Scripts
- Security
- Super Tags
- Alarming
- Indirect Tags
- Data Logging and Trending

Prerequisites:

Siemens Step 7



Objective:

On completion of the course the student will be able to:

- Understand the overview and the operational principle of a Wincc SCADA/HMI Systems.
- Identify and describe the functions of the SCADA/HMI System.
- Operate a SCADA/HMI Systems-Siemens Wincc efficiently.
- Design a basic SCADA/HMI Systems using Siemens Wincc flexible software and integrate to a programmable Logic Controller.
- Effectively Carry out Basic Maintenance and Troubleshooting of a SCADA/HMI Systems with focus on Siemens Wincc flexible.
- Observe safe practices when working with a Siemens WinCC SCADA/HMI Systems

Duration:

5 Days

GPA-10: HMI/SCADA Development Using Factory Talk View

GACA

Overview:

This course provides trainees with the knowledge and skills necessary to successfully design and build a factory view application. It provides the attendees with the skills necessary to design, develop, install, maintain and troubleshoot FactoryTalk® View applications that run on PanelView.

This course provides opportunities to work with both the hardware and software. During class, the attendees will gain the hands-on skills required to prepare a PanelView HMI system for operation.

Training for:

Service and Maintenance Engineers, Automation Engineers/ Technicians, personnel with responsibilities to operate or manage SCADA/HMI Systems and people who will be developing or operating a new or existing systems.

Course Content:

- Introduction
  - General Introduction to the course
  - Introduction to FactoryTalk View Applications
- Configuring a PanelView Terminal
- Creating and Customizing a FactoryTalk View Application
- Configuring RSLinx® Enterprise Communications
- Configuring FactoryTalk Security
- Creating and Modifying Tags
- Adding and Configuring FactoryTalk View Graphic
- Creating and Manipulating Graphic Objects
- Creating and Configuring Interactive Controls
- Configuring Security for FactoryTalk View Displays
- Creating and Managing FactoryTalk View Runtime Files
- Configuring Basic Animation for FactoryTalk View Objects
- Creating and Configuring Alarms
- Configuring Recipes with the Recipe Plus System
- Configuring Language Switching
- Creating Data Logs and Trends
- Creating Tag Placeholders and Parameter Files
- Creating and Configuring
- Information Messages
- Adding Global Objects to a FactoryTalk View Application
- nserting Faceplates in a FactoryTalk View Application

Prerequisites:

RSLogix 500 / Studio 5000 Logix Designer

Objective:

On completion of the course the student will be able to:

- Prepare a PanelView terminal for operation
- Create a new application and run it on a terminal
- Create, configure, and animate graphic objects on graphic displays
- Configure security for granting/restricting access to certain graphic displays or for rights to perform certain actions
- Create and configure messages and alarms for alerting operators to changes in a process

Duration:

5 Days

GPA-11: Allen Bradley PLCS Design, Programming & Maintenance Course

Overview:

Good knowledge of PCS design, Programming and maintenance is key in any production Plant. With basic or no prior knowledge of PLC programming and designs, this course will take you from scratch to an intermediate level you on how to design control system using Allen Bradley Micrologix, SLC and Controllogix family.

Focus will be on PLC based control system project development including specification/parameter analysis, control system design, field devices selection, I/O configuration, PLC selection, project development, implementation and integration with HMI Wonder ware Intouch.

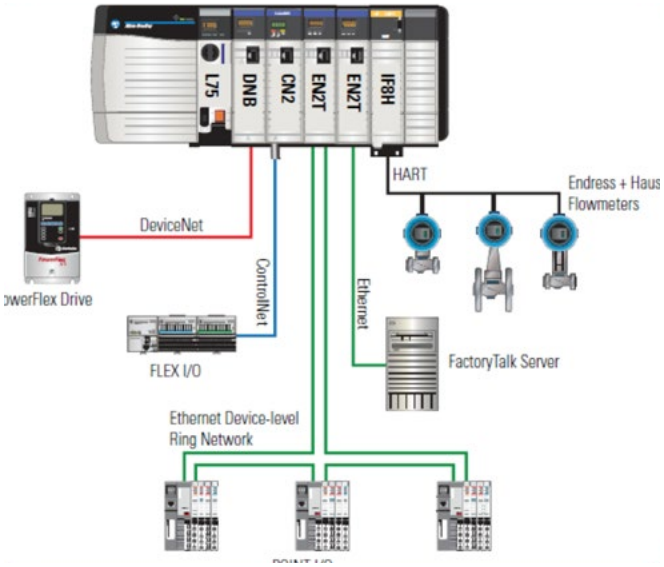
Training for:

Electrical Engineers,Control Engineers, Automation Technicians, New Recruit Engineers and other Personnel involved in design, installation, operation & maintenance of Monitoring, Automation and control systems

Course Content:

Case Study: Allen Bradley PLCs

- PLC project structure development
- Control system requirements, parameters and specification analysis
- PLC based control system design
- Assigning I/O modules to field devices
- Programming with RS Logix 500 & RS Logix 5000
- Basic & Complex instructions, Subroutines and interrupts
- Analog Signal Processing
- Industrial Networking of PLCs
- Remote IO Modules Configuration & Control
- Project commissioning
- Diagnosing faults using software and hardware (machine) diagrams
- Class Projects on Industrial Applications



Course Benefits:

At the end of the course, participants will be able to:

- Design, structure, program and implement a PLC based control system
- Carry out good components selection and work with analog signals resolution and scaling.
- Develop complex industrial application including subroutines, interrupts and clocks
- Observe safe practices in dealing with PLC controls systems.

Duration:

10 Days

CIAS: Certificate in Industrial Automation Systems

GACA

Overview:

This course provides an overall exposure to the technology of Industrial Automation and Control Systems as widely seen in almost all the industries today. Industrial Automation is increasingly growing especially within the Power sector, Automobile, Oil and gas, Manufacturing, Mining, food and beverage etc.

Process Automation provides the technology to control and monitor the process in industrial plants using concepts such as feedback, cascade, feed forward and advanced process control. This Industrial Automation course is aimed to empower attendees with the foundation, intermediate and professional level of knowledge that is required in the Industrial Automation and Control engineering field.

Course Content:

This is a 2 – month training curriculum structured and tailored to cover skills needed to effectively install, manage, troubleshoot, service and maintain systems and processes involved in the Industries.

- **MODULE 1:** Introduction to Industrial/Plant Automation
- **MODULE 2:** Rockwell Automation PLC Programming & Maintenance Course
- **MODULE 3:** Siemens PLC Programming & Maintenance Course
- **MODULE 4:** HMI/SCADA Systems Fundamentals - WinCC Flexible / Wonderware Intouch
- **MODULE 5:** Instrument Verification, Maintenance and Calibration Principles
- **MODULE 6:** Industrial Motor Control: Operation, Troubleshooting & Maintenance
- **MODULE 7:** Fundamentals of Variable Frequency Drives-Maintenance, Troubleshooting & Repairs
- **MODULE 8:** Electrical & Instrumentation Measurement, Interpretation, Design and Assembling

Course Benefits:

Among other, at the end of this course, the attendees shall be able to;

- Understand the concepts of Process Automation, and Control Systems.
- Understand the key components of Process Control Systems: PLC, HMI, SCADA and DCS etc.
- Understand Input / Output Systems, Controller,Supervisory Network, Layers of automation, Fieldbus system basics, Trend of Process Parameters basics.

- Install and work with different automation software e.g Rockwell Automation studio 5000, Rslogix 500, Rslinx, Siemens Simatic Step 7, TIA Portal
- with WinCC etc.
- Learn different programming languages for PLC Programming
- Write and Debug PLC Programs to run various processes and flow systems of various industries such as power plants, food industry, manufacturing industry, etc.
- Hands-on practice on PLC software to gain practical knowledge
- Work on PLC software and simulators to gain real-time knowledge on the softwares
- Understand the concepts of Hardware/Software classification of Automation
- Learn the basics of HMI and understand the similarities and differences between HMI and SCADA
- Learn about PI&D, process flow diagrams and how to effectively plan, plot, manage the process
- Learn about different Field Instruments
- Understand the importance of PLC / PAC in the industries and the need for Automation Engineers

Duration:

2 Months

Greenpeg Instrumention Courses

GPI-1: Fundamental of Instrumentation and Control

Overview:

This course will cover areas pertaining to the instrumentation, basic concept of control system and components (sensors, input/ output elements, controllers, final control elements) of a typical industrial system.

Specific instrumentation and controls for pressure, temperature, flow, level, density, control valve, and field data acquisition systems will be covered. This course will go on to explain the basic working principles, measuring devices, operations, and specifications as applicable to the major industries..

WHO SHOULD ATTEND?

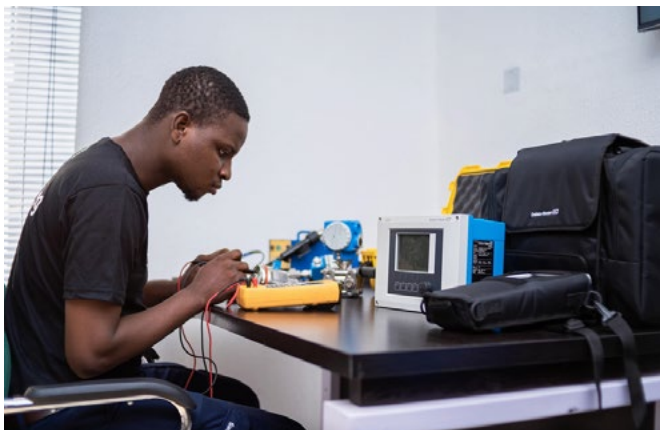
Engineers and Technicians with little or no knowledge of instrumentation and aspired or employed in the design phase, operations and maintenance.

Course Content:

» Introduction
  > Course overview
  > Definitions

» Process Measurements
  > Purpose
  > Types of process measurements
  > Terminology
  > Design Considerations
  > Maintenance/Operations Considerations
  > Pressure,
  > Temperature
  > Level
  > Flow
  > Custody Transfer
  > Signal Communication

» Final: Control Elements
» Terminology
» Manipulated Variables
» Final Control Elements
» Control Valves
» Maintenance/Operations Considerations
» Types
» Characterization
» Sizing
» Design Considerations



» Variable Frequency Drives

» Basic Regulatory Control
  > Purpose
  > Terminology
  > Basic Control Theory
  > Control Algorithms
  > Control Strategies
  > Loop Tuning
  > Design Considerations
  > Operation/Maintenance Considerations
  > Advanced Regulatory Control

Objectives:

At the end of this course, all trainees shall be able to understand;

» Field measurement devices including level, pressure, temperature flow
» Final control elements, including a step by step approach to sizing control valves
» Basic control theory
» Common control algorithms
» Key design, maintenance and operations I&C considerations

Duration:

5 Days

GPI-2: Piping and Instrumentation Diagram (P&ID)

GACA

Overview:

Accurate drawings – and the ability to interpret them – are crucial to effectively assess emergency situations and evaluate safety, environmental and regulatory compliance issues. This course will equip the attendees with techniques to master the reading and interpretation of Industrial Piping and Instrumentation Diagrams.

Trainees will be using actual Industrial Prints as study material. The course shall combine classroom instruction and workshop training exercises focuses on critical documentation essential to the safe day-to-day operation of facilities (e.g.P&ID, PFD, Plot Plan, Piping Drawing, etc.).

Who Should Attend:

This course is intended for: Operations and Maintenance personnel in the industry. People interested in drafting Construction workers such as pipefitters and plumbers People who work with Lockout/Tagout safety systems.

Course Content:

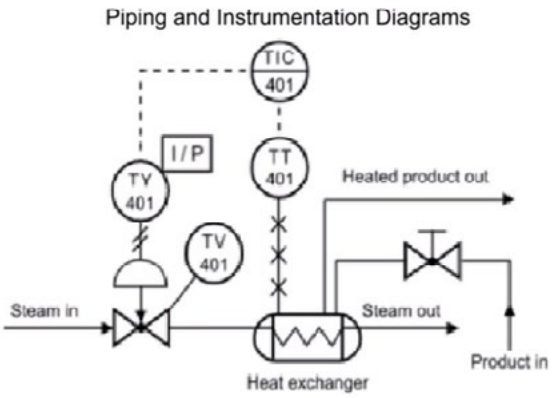
» Introduction

» Preliminary Engineering Drawings
  > Block Flow Diagram (BFD)
  > Process Flow Diagram (PFD)
  > Material Balance
  > PFD Symbols

» Piping and Instrumentation Diagrams
  > Piping and Instrumentation Diagram (P&ID)
  > P&ID Symbols
  > Line Numbering
  > Valve Numbering
  > Equipment Identification
  > Abbreviations

» Interpreting P&IDS - Valves
  > Valve Types
  > Valve Identification
  > Valve Fittings

» Interpreting P&IDS - Equipment
  > Vessels
  > Pumps
  > Heat Exchangers
  > Compressors
  > Equipment Identification



» Drawing Interpretation Workshop

» Interpreting P&IDS – Control & Safety Systems
  > Instrument Symbols
  > Instrument Signal Lines
  > Pressure Instruments
  > Temperature Instruments
  > Flow Instruments

» Detailed Engineering Drawings
  > Plot Plan
  > Electrical Area Classification
  > Piping Drawing
  > Isometric
  > Material Take Off
  > Line List
  > Tie-in List
  > Shutdown Key

» Drawing Interpretation Workshop

Objectives:

At the end of this course, all trainees shall be able to;

» Have the skills necessary to read and understand Piping and Instrumentation Diagrams (P&ID's).

» Learn the basics of blueprint reading and interpreting symbols used to represent piping, valves, signals, instruments, tags and more It will provide improvement in quality and consistency.

Duration:

5 Days

GPI-3: Process variables (Flow, Level, Temperature & Pressure): Operation, Maintenance & Troubleshooting

GACA

Overview:

This training course will cover all issues in Instrumentation & Field Instruments Servicing, Maintenance and Troubleshooting.

This training course will ensure that your engineers and technicians gain the highest level of process Instrumentation & Field Instruments Servicing knowledge and skills. It will also develop skilled maintenance professionals who understand operating principles and capabilities of process instrumentation and know how to install, commission, service, operate, and troubleshoot field process instruments.

Who Should Attend:

Engineers and Technicians involved in the Process Industry who requires an appreciation and understanding of the techniques used in Process Measurement and Control.

Course Content:

» Process Field Instrumentation and Process Control Loops
- > Terms and definitions associated with Instrumentation systems
- > Components of field Instrumentation Control Loops: Sensors, Transducers, Transmitters Controllers and control valves
- > Applications Process control loops (Pressure, Level, Temperature and Flow)
- > Instrumentation Calibration Parameters: Range, Span, and Zero Process Instrumentation Signals
- > Process Field Transmitters (Smart, Electronic and Pneumatic)
- > Smart transmitter Configuration Parameters
- > Differential pressure transmitter (Installation, Wiring, Calibration and Configuration)
- > Troubleshooting field instrumentation control loops

» Industrial Temperature Measurements
- > Industrial thermocouple (TC), applications, TC wiring and code
- > Thermocouple field installation, wiring and testing
- > Thermocouple Temperature Transmitter and Calibration Procedure
- > Temperature signal converter (TC) Thermocouple
- > Industrial Resistance Temperature Detectors RTDs and Thermistor

» Calibration Procedure of RTDs Temperature Transmitter and RTD sensors signal converter
- > Temperature Switches and industrial applications.
- > Testing and Calibration of Temperature switches (Set and Reset)

» Level Measurements
- > Continuous level measurement, level gauges and indicators
- > Magnetic and Displacer Level Indicator/Transmitter
- > Level Measurement by Hydrostatic Head
- > Hydrostatic Head calculation applied in open and closed tank
- > Closed and open Tank Level Measurement with a DP Transmitter
- > Interface Measurement two and three-phase Separators in Oil Production
- > Ultrasonic and radar Level Measurement Installation and programming
- > Level switches installation and calibration

» Pressure and Flow Measurement
- > Principles of Pressure measurement
- > Pressure gauges Calibration, Assembly and Disassembly
- > Pressure instruments installation considerations and applications
- > Calibration of Pressure Gauges and Switches (Set and Reset)
- > Process Flow Rate Measurements by Orifice Plate applications
- > D/P transmitter with Flow Measurement/Square Root

Extraction
- > Calibration and Configuration of differential pressure flow transmitters
- > Digital Flow meters and Counters applications, configuration and calibration

» Analytical Measurements and Applied Process Instrumentation.
- > Process analytical Measurements
- > Analyzer principles, configuration and probes Installation
- > Conductivity and Concentration analyzer (probe Installation & Calibration & Configuration)
- > Turbo compressor and turbine Lube/Seal oil control system
- > Boiler field instrumentation
- > Heat exchanger field instrumentation

Objectives

At the end of this course, all trainees shall be able to:

- » Develop specific skills, competencies, and points of view needed by professionals in the field most closely related to Instrumentation & Field Instruments Servicing.
- » Understand the major process variables (Temperature, Level Pressure Flow, Analytical) controlled in the Process Industry
- » Describe the types of petrochemical and refining industry drawings.
- » Designing field process control loops and the elements that are found in different types of loops, such as controllers, regulators and final control elements
- » Applying practical skills for testing, maintaining and modifying process field instruments (Smart electronic and pneumatic).

Prerequisites:
- » Basic computer knowledge
- » Background in control and automation

Duration:

5 Days

GPI-4: Instrument Verification, Maintenance & Calibration

Overview:

This course has been designed to introduce participants to the basic principles of Instrument verification, maintenance and calibration. They will learn about the responsibilities of the instrument technician and the importance of accuracy and documentation. The participants will gain knowledge in the various calibration procedures of various types of measuring instruments, as well as the more complex final control elements.

Training for:

Personnel involved in design, installation, operation and maintenance.

Course Content:

» Calibration and Verification
  > Responsibilities
  > Documentation
  > Procedures

» Introduction to calibration and Verification principle
  > Pressure, temperature, level & flow instrument/gauges calibration
  > Pneumatic and current conversion system
  > Abbreviations definitions (MPA, KPA, PSI, BAR, KGF/CM)

» Current loop characteristics
  > Pre-check: Checking for open circuit & Checking for short circuit
  > Loop check

» Familiarization with measuring instruments
» Selection of Measurement and Control Devices
» Repair modes and records; Failure mode analysis;
» Maintenance, calibration modes, and records; Calibration seals; Tools and equipment
» Handling equipment; Cleaning and decontamination; Testing and evaluation; Disassembling and reassembling; Calibration; Test stands
» Troubleshooting instrument error
» Safety while working with instruments
» Hands-on practical exercises & simulations

Objectives:

On completion of the course the student will be able to:

» Define calibration
» Recognize if an instrument is properly calibrated by examining the instrument input and output
» Explain how calibration affects quality, productivity, and safety
» Identify conditions when calibration is performed such as at an installation, periodic scheduled maintenance, in response to process deviation, and after repair or change in mounting position
» Recognize accuracy and precision
» Identify zero shift, span error, combined zero shift and span error, and non-linearity with a pattern of instrument readings on an input/output graph or calibration data sheet
» Identify the basic elements of a calibration set-up
» Identify the input values for a five point
» Calibration check as a percent of the instrument's range

Duration:

5 Days

Greenpeg Mechanical Courses

GPM-1: Fundamentals of Mechanical Engineering

Overview:

This course focuses on the fundamentals of mechanical engineering, to provide delegates with the necessary knowledge, skills and safe working practices to enable them to safely undertake a range of mechanical tasks in an industrial environment.

This course will enable Technical personnel to familiarize with engineering techniques including inspection; monitoring and condition evaluation.

This training course also is designed to allow individuals working in fields such as mechanical, process and petrochemical engineering, and other related fields, an opportunity to update their skills and improve their basic knowledge of modern mechanical engineering skills.

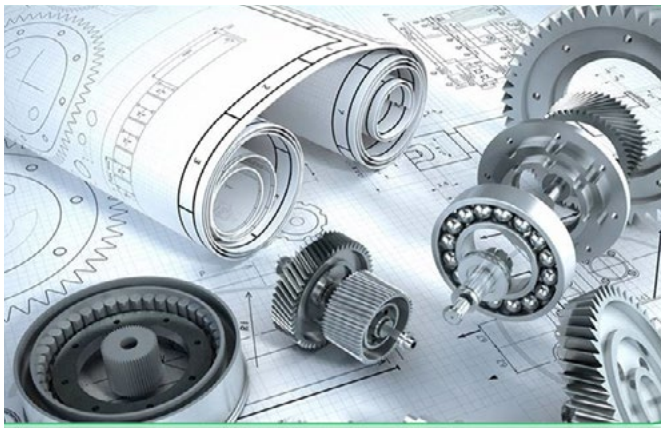
Course Content:

» Pressure Vessels (Static Equipment)
- > Pressure vessel parts and Service Classification
- > Overview of ASME VIII-1
- > Material Selection, Designation and Essential Properties
- > Corrosion, Types, Allowance and protection
- > Overview of API pressure vessel inspection
- > Non-Destructive Examination

» Heat Exchangers (Static Equipment)
- > Classification of Heat Exchangers
- > Overview of TEMA
- > Design of Shell and Tube heat Exchangers
- > Design of Air cooled and Plate Heat Exchangers
- > Overview of API 660 and API 661
- > Heat Exchangers Failure Mechanisms

» Valves And Piping (Static Equipment)
- > Valves Types and Characteristics
- > Valve Components, Selection and Materials
- > Valve and Actuators Sizing
- > Piping Systems and Pipe Materials & Coatings
- > Overview of API 570 - Inspection & Repair of Pipelines
- > Fitness for Service, API 579 overview

» Pumps And Compressors (Rotating Equipment)
- > Pump Types and Performance Curves
- > NPSH and Cavitation
- > Pump Selection and Sizing



- > Types of Compressors and Performance Curves
- > Surge, Stall and Chocking

» Turbines (Rotating Equipment)
- > Classification of turbines
- > Gas turbines Main Components and Control
- > Steam Turbines Main Components and Control
- > Turbine Materials and Coatings
- > Failure analysis of Gas Turbine Components
- > Failure analysis of Steam Turbine Components

Objectives:

At the end of this course the attendees will understand:

» Pressure vessels design, inspection and materials selection
» Heat exchangers types, design and failure analysis
» Valves types, sizing and materials selection
» Piping system design, inspection and fitness for service
» Pumps & compressors types, sizing and problems
» Turbines main components and failure analysis

Duration:

5 Days

GPM-2: Pneumatics: Operation & Maintenance

GACA

Overview:

This course provides maintenance personnel and production operators etc. with the skills and knowledge necessary to carry out maintenance tasks on pneumatic and hydraulics systems.

A practical approach is taken throughout this course with participants gaining valuable 'hands-on' experience on training equipment utilizing industry-standard components designed to simulate industrial systems.

Training for:

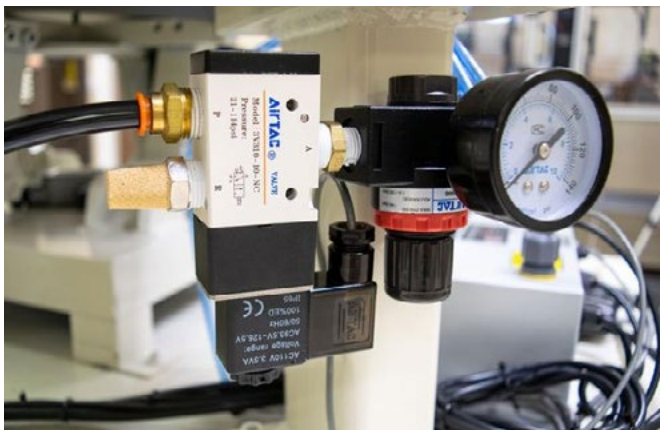
Personnel involved in design, installation, operation and maintenance of Pneumatics System.

Prerequisites:

Instrumentation, Process and Control Essentials) or equivalent relevant experience

Course Content:

- Pneumatic Systems
  - Air supply system;
  - Reciprocating and rotary compressors; Cooling; Compressor maintenance;
  - Air-line filters and lubrication
- Pneumatic Schematic Diagrams
  - Schematic symbol construction;
    - ☑ Diagramming an air supply;
    - ☑ Simple pneumatic systems;
    - ☑ Timing and safety circuits;
    - ☑ System schematics
- Installation of System Components
  - Compressor intakes and foundations; Aftercoolers; Receivers; Dryers;
  - Pipe installation and support; Tubing and hose fittings; System installation.
- System Maintenance
  - Pneumatic system maintenance; Cylinder maintenance; Tool maintenance; Logs and records; Automatic recorders and recording charts.
- Determining System Failures
  - Locating troubles; Operations manual; Checking the air supply; Troubleshooting valves and actuators; Interlocks; Final adjustments.
- Troubleshooting Air Compressors
  - Compressor cooling, lubrication, and valves; Crankcase ventilation; Piston rings; Bearings; Control systems; Troubleshooting



- Troubleshooting Control Valves
  - Checking manual overrides, circuit sequence, and solenoids; Improper sequence and valve shifting; Control timing; Lubrication problems.
- Troubleshooting Cylinders
  - Cylinder construction; Checking for correct size, clogged filters, frozen air lines, and cylinder misalignment; Worn packings and seals; Controls.
- Troubleshooting Air Motors
  - Checking for sufficient air; Contamination; Lubrication; Air motor abuse; Hose and clamp maintenance; Vane and piston motors.
- Pneumatic VS Hydraulic Systems
  - Air-oil tanks; Pressure boosters; Hydraulic control; Pneumatic cushioning; System interlock; Pneumatic servos; Troubleshooting.

Objectives:

- Understand the need for safe isolation and be able to apply safe working practices when working with pneumatic and electro-pneumatic systems.

- Demonstrate relevant underpinning knowledge (units, pressure, forces, etc.).
- Identify, inspect, adjust and replace:
  - Sensors (pneumatic valves and electrical switches, proximity sensors and switches).
  - Valves (air and solenoid operated, sequence, directional control).
  - Actuators (cylinders and rotary).
  - AND / OR elements, relays, timers, flow controls and quick exhausts.
- Use visual indicators and manual overrides to check operation of components.
- Carry out repairs to pneumatic systems, replace fittings, plastic pipe-work, etc.
- Use pneumatic circuit drawings as an aid to systematic fault-finding.
- Understand how PLCs are interfaced and used to control pneumatic systems.

Duration:
5 Days

GPM-3: Hydraulics System: Operation & Maintenance

Overview:

This course delivers an interactive training experience designed to help trainees understand the various components found in a typical hydraulic system and how these components function and interact with each other. It provides maintenance personnel and production operators etc. with the skills and knowledge necessary to carry out maintenance tasks on hydraulic systems.

A practical approach is taken throughout this course with participants gaining valuable "hands-on"experience on training equipment utilizing industry-standard components designed to simulate industrial systems.

Training for:

Personnel involved in design, installation, operation and maintenance of hydraulic system.

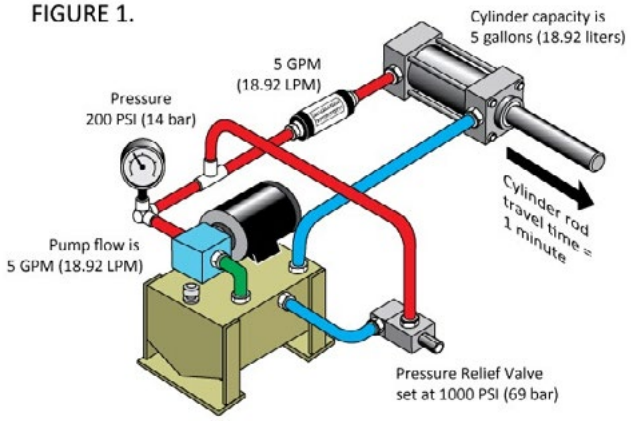
Prerequisites:

Instrumentation, Process and Control Essentials) or equivalent relevant experience

Course Content:

- Principles of Hydraulics and Hydraulic Fluids
  - Pascal's Law
  - Main Components of a hydraulic System
  - Filters, Reservoirs and Accumulators
  - Closed and Open Loop
  - Properties of Hydraulic Fluid
  - Types of Hydraulic Fluids
  - Fluid Selection
  - Problems Related to Hydraulic Fluids
- Hydraulic Pumps & Actuators
  - Classification and performance of Hydraulic Pumps
  - Variable and Fixed Displacements
  - Hydraulic Pumps
  - Gear Pumps
  - Vane Pumps
  - Piston Pumps
  - Pressure Compensator, and Load Sense Control
  - Hydraulic Cylinders
  - Hydraulic Motors
- Control Valves
  - Classification of Control Valves
  - Direct-Acting and Pilot-Operated Valves
  - Pressure Control Valves
  - Directional Control Valves
  - Flow Control Valves

FIGURE 1.



  - Meter In and Meter out
- Operation and Hydraulic Circuits
  - Operator Responsibilities
  - Symbol of Hydraulic Components
  - Operation of Regenerative Circuits
  - Counterbalance Circuits
  - Decompression Circuits
  - Hydraulic Circuits of Various Machines
  - Case Studies
- Maintenance and Troubleshooting of Hydraulic Systems
  - Flow Chart of Hydraulic Circuits
  - Troubleshooting of Different Components of Hydraulic Systems
  - Assembling and Disassembling Hydraulic Units
  - Inspection and Testing of Hydraulic Systems
  - Maintenance of Hydraulic Systems.

Objectives:

At the end of this course the attendees will ba able to:

- Apply safe working practices when working with hydraulic systems
- Understand the relevant theory (units, flow, pressure, temperature, forces, etc.)
- Understand the operation of hydraulic circuits and components typically used in industry
- Correctly maintain power units (fixed / variable pumps, reservoirs, filters, strainers and gauges)
- Use hydraulic test equipment to determine the nature and position of faults
- Construct a range of functional hydraulic circuits
- Assess the condition of a hydraulic system by oil analysis
- Use hydraulic circuit drawings and fault-finding charts as a systematic aid to fault-finding
- Select the correct tubing and fittings for hydraulic applications
- Correctly cut and bend tubing
- Understand how to form ferrules
- Understand the importance of pressure testing
- Understand the importance of correct filter selection.

Duration:

5 Days

GPM-4: Valves, Pumps and Compressors: Selection, Operation & Maintenance

Overview:

This course will equip attendees on the principles of the operation and maintenance of valves, pumps and compressors one at a time. Valves, Pumps and compressors applications are extensively useful in many process industries.

Understanding of how to operate the valves, pumps & Compressors correctly as well as knowing the appropriate maintenance and troubleshooting methods are vital for trouble free plant operation. During the course participant's discussion, comments, bringing up their own problems are welcomed and encouraged.

The training will be in three modules. Each module will treat one of the three instruments.

WHO SHOULD ATTEND?

Instrument, Control, Maintenance Engineers, Technicians, Facility Managers and System Integrators.

Prerequisites:

GPI 1 (Instrument Verification, Maintenance & Calibration) or Equivalent relevant experience

Course Content:

» Valves Technology
  > Types of Valves (globe, gate, ball, plug, check)
  > Flow Characteristics
    ☑ Flow through Valves
    ☑ Valve Flow Characteristics
    ☑ Linear, Quick Opening & Equal %
  > Valve Sizing
    ☑ Calculating the Correct CV Value
    ☑ Selecting Valve Size Using Valve Coefficient
    ☑ Calculations for Correct Valve Selection
  > Sealing Performance
    ☑ Leakage Classifications
    ☑ Sealing Mechanisms
    ☑ Valve Stem Seals
» Valves Troubleshooting & Maintenance
  > High Pressure Drop
    ☑ Pressure Recovery Characteristics
    ☑ Flow Choking
    ☑ High Velocities
  > Water Hammer
    ☑ What causes water hammer?
    ☑ Solutions for Water Hammer
  > Troubleshooting the Control & Isolation Valves
    ☑ Review of Common Faults
    ☑ Developing a Preventive Maintenance Plan
  > Review of the Week & Wrap-Up
» Classification, Types of Pumps & Compressors
» Centrifugal pumps
  > Operating characteristics
  > Priming, cavitation
  > NPSH, NPSH margin
  > Power requirement for pumping.
» Pump performance curves
  > Head – capacity curve [H – Q]
  > Power – capacity curve [P – Q]
  > Efficiency – capacity curve [? – Q]
  > Specific speeds
  > Operating point of centrifugal pump
» Compressor working principles, types, operational aspects
  > Classification, Types of compressors
  > Operational principles and constructional features
  > Compressor operation

GPM-4: Valves, Pumps and Compressors: Selection, Operation & Maintenance (CONTD.)

- Oerformance characteristics curves
- Minimum and maximum flow, constraints
- Surge, significance and control
- Compressor selection and specification, criteria for drive rating selection
- Performance testing
- Standards and acceptance criteria for performance testing

» Operation & Troubleshooting
- Start-up, priming, shut down
- Vibration levels and their measurements.
- Bearing housing temperatures
- Accessories [shaft seal, bearing]

» Trouble shooting [symptoms, causes, Remedial measures)
- The functions of a bearing in rotating machines.
- Bearing and Shaft alignment
- How to correct for misalignment.
- Tools for servicing.

» Preventive and predictive maintenance
- Maintenance by Plan vs. Maintenance by Default
- Equipment reliability and availability
- Building a maintenance management plan

Objectives:

At the end of the course, participants will:

» Understand the different types of Valves, Pumps & Compressors and the range of their applications
» Be able to read and interpret the performance curves of Valves, Pumps & Compressors
» Be able to understand the overview of testing standards/ codes
» Understand Operation, maintenance & Troubleshooting aspects including the Start-up, priming,shut down
» Know Preventive and Predictive maintenance of Valves, Pumps & Compressors
» Be able to monitor Vibration levels and their measurements.
» Know the significance of bearing housing temperatures etc.
» Understand principles of Condition Based Monitoring.

Duration:

5 Days

GPM-5: HVAC-Heating Ventilation & Air Conditioning: Operation, Troubleshooting & Maintenance

GACA

Overview:

Fundamentals of air conditioning system give comprehensively understanding air treatment
and heat transfer principle in reducing energy cost, besides essential knowledge of fluid mechanics in air conditioning system. This plays important role on operation and maintenance of air conditioning systems.

This course will enable the attendees to be able to analyze and recommend the most effective solution available in air conditioning system for operation and maintenance, enable to utilize energy as possible as saving due to limited energy resources, and also you are familiar and better understanding of all aspects relate to efficient air conditioning system in building.

Trainign for:

Engineers, Supervisors, Technicians, Project and Maintenance Engineers in charge of HVAC systems

Prerequisites:

Basic knowledge of refrigeration systems.

Course Content:

» HVAC Systems Design
- > Sources of heat load
- > Using the equation of each heat load for analysis and possible reduction in the heat load
- > Air treatment and human comfort
- > Evaluating and studying the outside and inside design conditions to meet the human comfort
- > Daily and monthly heat load profiles, how they affect the heat load
- > Selecting the type of AC system

» Piping System for Chilled Water Applications
- > Velocity/friction loss VS initial and running cost. How to decide which way to go
- > Closed or open type systems. (Advantages and dis-advantages of each type)
- > Pressure breakers and the need for high rise buildings
- > Expansion and contracting of the piping circuits and the selection of expansion joints, pressurized expansion & make up tanks
- > Refrigerants and their effect on AC systems selection and the environment

» Heat Transfer and Selecting the Right AC System
- > How cooling towers work for centralized water-cooled systems
- > Thermal storage
- > Types of thermal storage systems
- > Air cooled systems Load shifting (partial and full), daily and weekly, case study with calculations and comparison of C.O.P
- > Ventilation, infiltration, ex-filtration. How to minimize their heat loads.
- > Factors used to select the right AC system

» HVAC Operation
- > System components
- > System start-up preparation
- > System running conditions
- > Systems sequence of operation
- > System monitoring

GPM-5: HVAC-Heating Ventilation & Air Conditioning: Operation, Troubleshooting & Maintenance (CONTD.)

- > System partially stopping
- > System shutdown

» HVAC Maintenance

- > Scheduled preventive maintenance routines
- > Daily log sheets and the monitored items and logged records
- > Utilizing records history for improvement of systems reliability
- > Hand over package and its importance for proper maintenance
- > Training of hands on staff for better understanding of the systems to reduce down time and operational cost
- > Operation and maintenance case studies
- > Open discussions including any specific related cases from attendees

» Servicing and Troubleshooting

Objectives:

- » Understand the HVAC design as materials and equipment
- » Analyze the alternatives and select the best one
- » Determine the proper AC Units
- » Understand the operation modes
- » Develop the maintenance tasks from the available manuals

Duration:

5 Days

CIMS: Certificate in Industrial Mechanical System

Overview:

This course focuses on typical industrial applications of mechanical engineering technologies. It develops trainees ability to design and create mechanical systems, including those used in the manufacturing, bottling, breweries, Oil & Gas, automotive, aeronautics, robotics, and manufacturing industries. Subtopics include mechanics, fluid dynamics, heat transfer, and more shall be covered during the course of this training.

Upon completion of this program, you will gain skills and knowledge in the latest and developing technologies in mechanical engineering. It will equip the attendees with the necessary skills to address the demands of the mechanical engineering industry. Personnel with a background in mechanical, instrumentation & control, electrical, or industrial plant and systems engineering will be particularly well-placed to benefit from this program as it is designed to prepare them for further career development in the mechanical design and maintenance industries

Course Content:

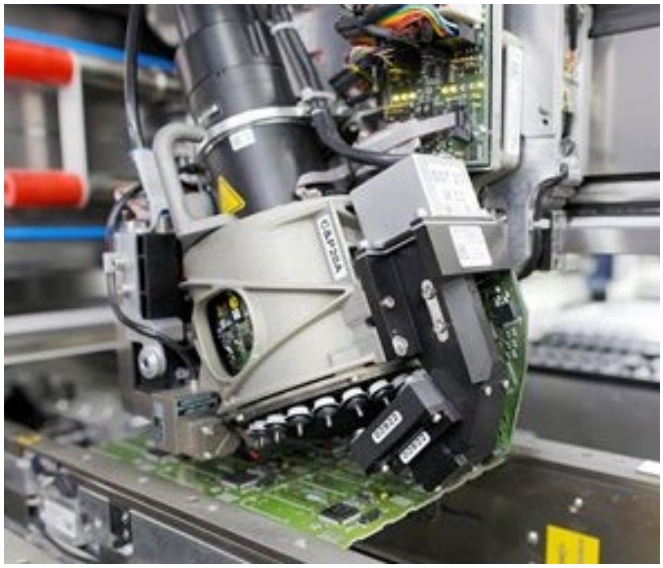
This is a 2 – month training curriculum structured and tailored to cover skills needed to effectively install, manage, troubleshoot, service and maintain systems and processes involved in the Industries.

- **MODULE 1:** Fundamentals of Mechanical Engineering
- **MODULE 2:** Materials, Codes and Standards in Mechanical Systems
- **MODULE 3:** Mechanical System Design
- **MODULE 4:** Gears and Bearings
- **MODULE 5:** Mechanical System Drives and Prime Movers
- **MODULE 6:** Fluid in Mechanical System
- **MODULE 7:** Manufacturing and Production Systems
- **MODULE 8:** Mechanical System Maintenance and Troubleshooting

Course Benefits:

At the end of this course, all trainees shall be able to;

- Iinterpret basic mechanical drawing and understand basic mechanical engineering concepts
- Understand the need for standardization and the common applicable mechanical standards and codes
- Understand and determine the importance of common mechanical engineering material properties in relation to component life and failure.
- Perform basic design for static strength.
- Apply principles governing the operation of common mechanical drive components, prime movers and actuators



- Select appropriate gears and bearings
- Understand, Monitor, control and evaluate vibrations
- Select the appropriate manufacturing system and understand the principles of design for manufacturing
- Initiate and set up an effective but simple inspection and maintenance programme (including lubrication)
- Appreciate the need for standardization and understand the common applicable mechanical standards and codes

Duration:

2 Months

Greenpeg Engineering DesignSoftware Course

GPDA-1: Autocad 2D

Overview:

This course provides maintenance personnel and production operators etc. with the skills and knowledge necessary to carry out maintenance tasks on pneumatic and hydraulics systems.
A practical approach is taken throughout this course with participants gaining valuable 'hands-on' experience on training equipment utilizing industry-standard components designed to simulate industrial systems.

Trainign for:

Engineers, Supervisors, Technicians, Project and Maintenance Engineers in charge of HVAC systems

Prerequisites:

Instrumentation, Process and Control Essentials) or equivalent relevant experience

Course Content:

» Introduction to Autodesk AutoCAD
> Starting the Software, User Interface, working with Commands, Cartesian Workspace, opening an Existing Drawing File and Saving a Drawing File.

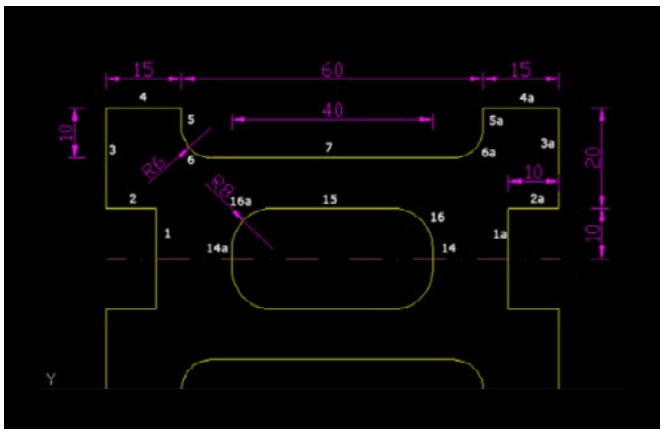
» Basic Drawing & Editing Commands
> Drawing Lines, Erasing Objects, Drawing Lines with Polar Tracking, Drawing Rectangles, Drawing Circles, Undo and Redo Actions

» Projects - Creating a Simple Drawing
> Create a Simple Drawing and Create Simple Shapes

» Drawing Precision in AutoCAD
> Using Running Object Snaps, Using Object Snap Overrides, Polar Tracking at Angles, Object Snap Tracking and Drawing with Snap and Grid

» Making Changes in Your Drawing
> Selecting Objects for Editing, Moving Objects, Copying Objects, Rotating Objects, Scaling Objects, Mirroring Objects, and Editing with Grips.

» Organizing Your Drawing with Layers
> Creating New Drawings with Templates, what are Layers, Layer States and Changing an Object's Layer.



» Advanced Object Types
> Drawing Arcs, Drawing Polylines, Editing Polylines, Drawing Polygons, and Drawing Ellipses

» Analysing Model and Object Properties
> Working with Object Properties and Measuring Objects

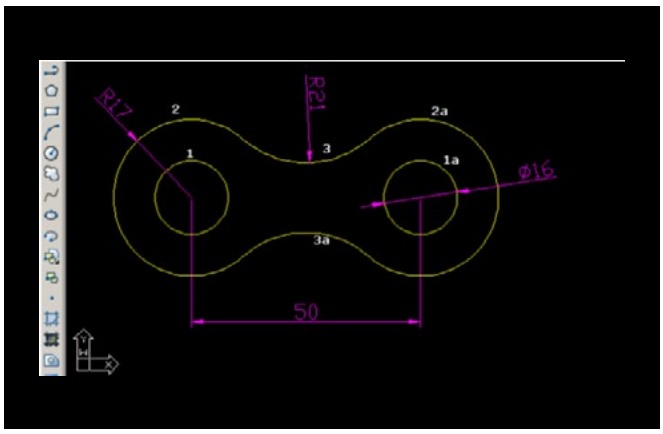
» Advanced Editing Commands
> Trimming and Extending Objects, Stretching Objects, Creating Fillets and Chamfers, Offsetting Objects, and Creating Arrays of Objects.

» Inserting Blocks
> What are Blocks, working with Dynamic Blocks, Inserting Blocks, Inserting Blocks using the Tool Palettes, Inserting Blocks using the Design Center, Inserting Blocks using the Content Explorer

» Setting Up a Layout
> Printing Concepts, working in Layouts, Creating Layouts, Creating Layout Viewports and Guidelines for Layouts.

» Printing Your Drawing
> Printing Layouts,Print and Plot Settings

» Text
» Working with Annotations, Adding Text in a Drawing, Modifying Multiline Text, Formatting Multiline Text, Adding Notes with Leaders to Your Drawing and Creating Tables.



» Hatching
  > Hatching
  > Editing Hatches

» Adding Dimensions
  > Dimensioning Concepts
  > Adding Linear Dimensions
  > Adding Radial and Angular Dimensions
  > Editing Dimensions

Course Benefits:

At the end of this course, participants will learn how to:

» Create 3D models from 2D designs.
» Use solid modelling, surface modelling and mesh modelling techniques.
» Create full working drawings of your 3D models.
» Produce visualisations of models, incorporating lighting and materials.

Duration:

5 Days

GPDA-2: Autocad 3D

Overview:

This session introduces the basics of 3D modelling using AutoCAD. It covers primitives (basic shapes) which can be used as the basis for other more complex shapes, or on their own and creating 3D scenes from 2D profiles. It then moves to show you creating composite solids which are objects that are produced by combining two or more individual objects. It also covers some of the techniques for working in 3D and also how you can create a 3D model from some of your existing 2D cross-sections.

Trainign for:

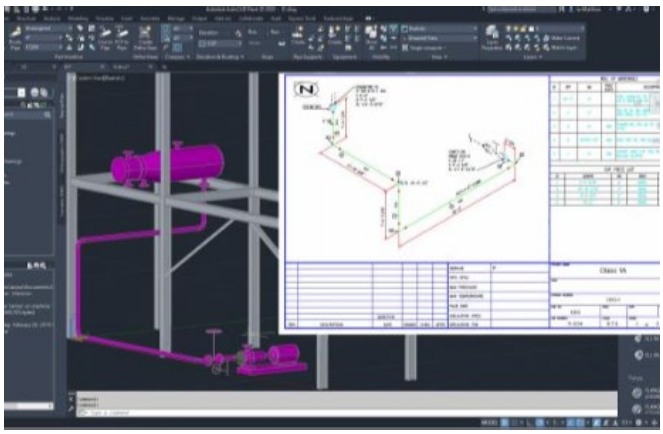
Engineers, Supervisors, Technicians, Project and Maintenance Engineers in charge of HVAC systems

Prerequisites:

Instrumentation, Process and Control Essentials) or equivalent relevant experience

Course Content:

- 3D Solids Modeling
  - Introduction to 3D Modeling, Creating Solid Primitives, Creating Models from 2D Profiles and Creating Composite Solids
- Editing Solid Models
  - Adding Detail to Your Solid Models
  - Changing the Model Position
  - Duplicating the Model
  - Getting Information from 3D
- Objects
  - Creating Drawings from 3D Models
- 3D Mesh Modeling
  - Creating Mesh models
  - Editing Meshes
  - Converting Meshes to solids and Surfaces
- Surface Modeling
  - Creating surface forms such as - Loft, Extrude, Sweep



- Visualization Tools
  - Using Visual Styles
  - Using Cameras and Views
  - Using Lights
  - Using Materials

Course Benefits:

At the end of this course, participants will be able to:

- Navigating the AutoCAD user interface.
- Use the fundamental features of AutoCAD.
- Use the precision drafting tools in to develop accurate technical drawings.
- Present drawings in a detailed and visually impressive manner.

Duration:

3 Days

GPDP-3: Plant Design & Management System (PDMS) Software

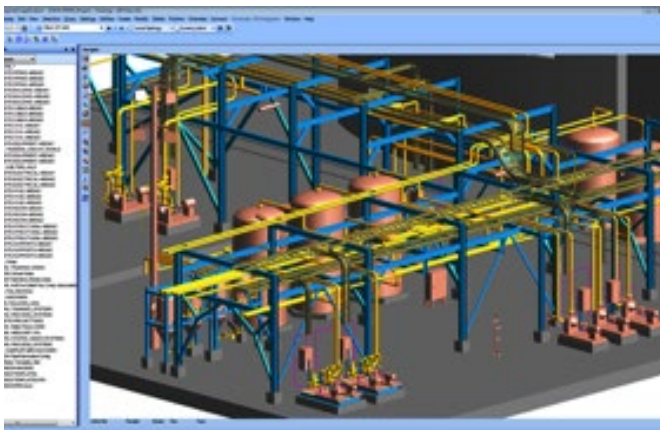
Overview:

This course is designed to equip participants in using the various tools and components in designing and modeling equipment's in 3D view. PDMS is industry standard software for 3D plant modeling. The software is equipped with vast capabilities including Equipment modeling, Pipe work modeling Drafting etc. Participants of this training will be exposed to the practical use of the software during the training, as they design an industrial operation

Basic knowledge of refrigeration systems.

Course Content:

- Equipment workspace review
- Equipment Hierarchy overview
- Equipment Module & Tabs
- Primitives
- P-Points
- Negative Primitives
- Equipment Modeling Options
- Model Editor for Equipment
- Creating Nozzles
- Obstruction Volumes
- Create Equipment using Templates
- Overview of PDMS
- Piping workspace & Hierarchy overview
- Overview of Piping Specifications
- Piping Settings
- Pipe creation form
- Model Editor & Settings
- Head & Tail attributes
- Isometrics
- Changing Specifications
- Forwards & Backwards mode
- Piping Assemblies
- Positioning functions
- Splitting & Merging Pipes
- Rotating Tool
- Data Consistency



Course Benefits:

At the end of this course, participants will be able to:

- Understand the role of PDMS in engineering industry
- Describe role and responsibilities of PDMS Engineer/ Designer/ Administrator
- Discuss piping engineering fundamentals along with pipe fittings and components
- Elucidate piping codes, standards, and calculations
- Able to create piping and equipment layout
- Develop equipment modeling and pipe modeling
- Prepare piping deliverable documents and drawings

Duration:

5 Days

GPDI-4: SmartPlant Instrumentation (INTools) Administration

Overview:

This course is designed for IT specialists and support personnel who are responsible for installation and system administration of SmartPlant Instrumentation. In this course, students will learn software and hardware requirements, system, installation, overview of database structure, database maintenance and overview of customization.

Topics Covered:

» SPI System Installation Overview
» Installation and Configuration on MS-SQL
» Intergraph Software Installation
  > SPLM Installation
  > SPLM Configuration
  > SPI Installation
» Database Preparation – DBSetup utility

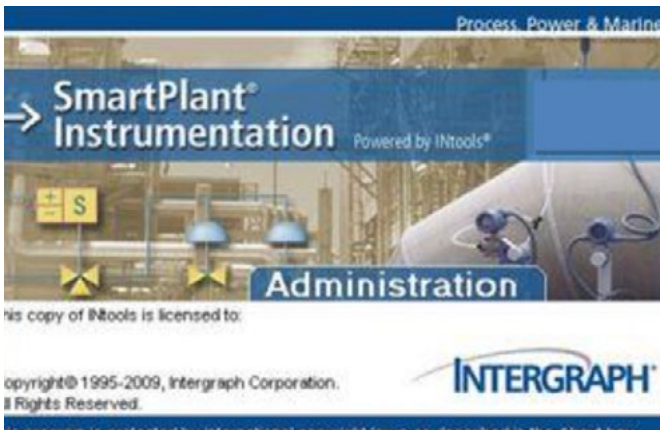
» SPI Admin Setup and Configuration
  > Domain Initialization
  > System Administration Schema
  > Domain Schema

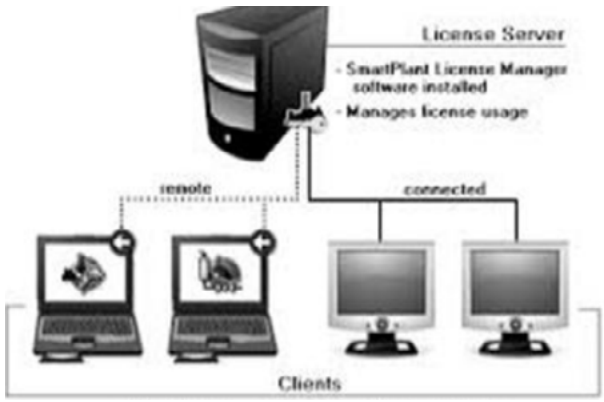
» System Administrator Topics
  > Domain Definition
  > Department and User Management
  > Security Options
  > Database Maintenance options

» Domain Administrator Topics
  > PAU Structure
  > Naming Conventions
  > Groups and Access Rights
  > Access Rights
  > Additional Activities
» Internal Setup Utility
» SPI Backups

Prerequisites:

» Familiarity with Microsoft Windows environment and applications
» Familiarity with relational database concepts





Course Benefits:

At the end of this course, participants will be able to:

» Understand the role of system and domain administrator
» Support and maintain project database for efficiency.
» Support users confidently.

Duration:

2 Days

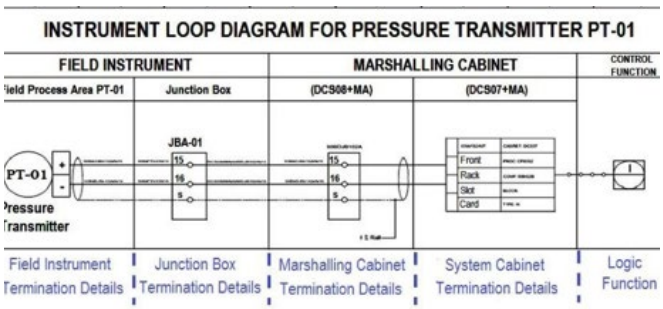
GPDI-5: SmartPlant Instrumentation for Users (INTools)

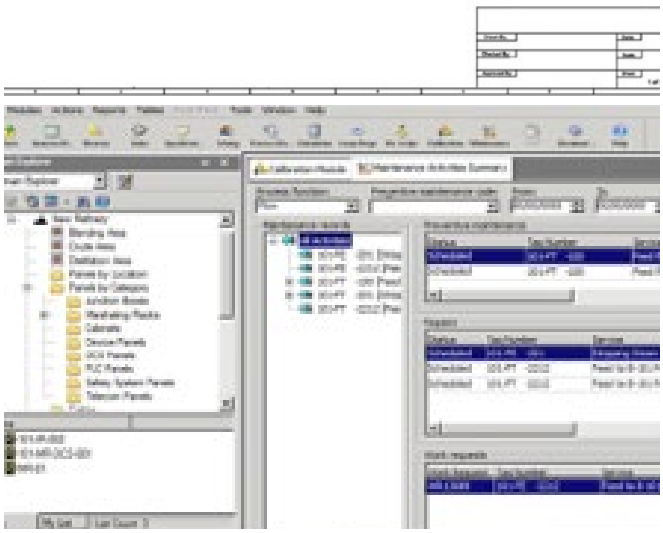
Overview:

This course is designed for instrumentation specialists involved in the definition and specification of instrumentation and control systems using the SmartPlant Instrumentation software. In this course, students learn how to define the instruments using SmartPlant Instrumentation as per the specifications of project deliverables.

Course Content:

- Introduction
  - SPI Modules overview & Basic Workflow
- Instrument Index Module
  - Populating instrument table, Adding Loops/Tags & Editing Loop/Tag properties
  - Utilizing the Index Browse & Index Module Reports
  - Typical and Batch loop creation
- Process Data Module
  - Defining Process data for process lines and Instruments
- Calculation Module
  - Performing calculations on flowmeters, Control Valves, thermowells & Relief Valves
- Specifications Module
  - Defining specification for instrument and generating reports
- Wiring Module
  - Wiring Methodology
  - Device panel creation and wiring
  - Terminal Strip and Cable configurations
  - I/O Card Configuration
  - Interconnection wiring and report generation
- Loop Drawing Module
  - Loop Drawing Management & Generation
- Hook-Up Module
  - Creating and using Hook-ups





Course Benefits:

At the end of this course, participants will be able to:

- Generate instrument index
- Generate instrument process data
- Perform calculation for field instruments
- Define Specifications
- Perform instrument interconnection wiring and generate reports
- Able to generate loop drawing
- Modify and effect changes made on field.

Duration:

5 Days

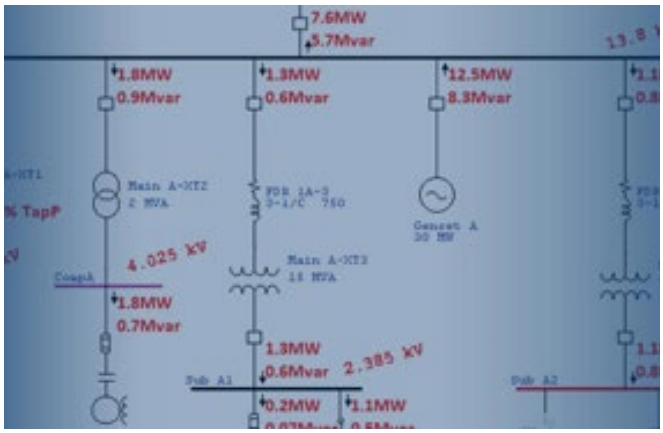
GPDE-6: Power Systems Analysis Course Using ETAP Software

Overview:

This hands-on workshop is specifically designed to cover the functionality of ETAP software. Industries nowadays are in pursuit of candidates having skills in Power system simulation packages. Having the knowledge to analyze power network and simulate power systems in ETAP software can help attendees to perform effectively in the power sector.

This course also covers all the fundamentals of conducting analysis in power systems, thus it will be easy for beginners to follow the course. Each lesson is tailor made to be detailed and precise with practical examples. Engineers in the industry can update and refresh their knowledge, and learn to analyse using in ETAP software.

Course Content:



» Introduction To Power systems Analysis and ETAP overview
- > One Line Diagram modelling in ETAP
- > Edit and Simulation Toolbars
- > ETAP Library
- > Creating OLV
- > System dumpster
- > AC Element Toolbars
- > Composite Networks
- > Adding Protective Devices
- > 3-D Modeling
- > Scenario and study wizard

» Load Flow (LF) Analysis
- > Input data required and entry
- > Calculation methods
- > Load Flow (LF) study case
- > Loading category
- > Generation category
- > Analysis running tools
- > Report and recommendation
- > Load Flow result analyzer
- > Load Flow study document and reports

» Motor Starting and Acceleration
- > Input data required
- > Static acceleration vs dynamic acceleration
- > Motor start (MS) study case
- > Analysis running tool
- > Starting device simulation
- > Report, plots and recommendation
- > Motor start study document

» Short Circuit Analysis and Calculation
- > Calculation methods
- > Duty, IEC60909 and IEC61363
- > Input data entry required
- > Short circuit (SC) study case
- > Device evaluation
- > Analysis tool
- > Vendor data comparison
- > Report and recommendation
- > Motor start study document

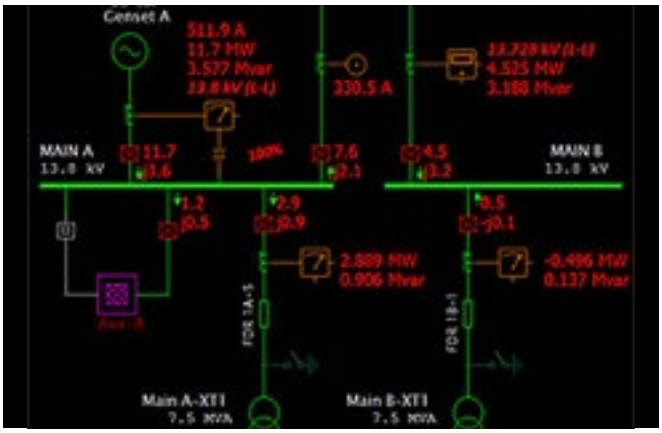
» Coordination Protection
- > Input data required
- > Vendor's data modeling
- > Coordination protection
- > Report and recommendation

» Arc Flash Analysis
- > Calculation methods
- > Arc flash study case
- > Definition of FCT, incident energy, flash protection boundary and hazard risk
- > Category
- > Minimum data entry
- > Personal protective equipment
- > Reports and label

GPDE-6: Power Systems Analysis Course Using ETAP Software (CNTD.)

» Protective Device Coordination
  > Device curve review
  > STAR study case
  > Interface with one-line diagrams
  > Minimum data entry
  > Changing device settings
  > STAR TCC features
  > Sequence of operation
  > Protection device study document

» Other Modules Based On Attendees Request and Time Permitting



Course Benefits:

At the end of the course, the attendees should be able to:

» Build system single line diagrams using IEC standards and ANSI standards.

» Interpret and analyze Electrical study reports such as Load Flow report, Short Circuit report etc.

» Size protective devices; understand the principle of electrical protection and Transient Stability.

» Read and interpret TCC curves, Understand Arc Flash analysis, and recent IEEE and IEC regulations.

Duration:

5 Days

Greenpeg Engineering Eletric/Power Course

GPE-1: Introduction to Electrical System and Safety

Overview:

This training course will familiarize students with the occupational safety and health concerns which should be inherent in every electrical system.

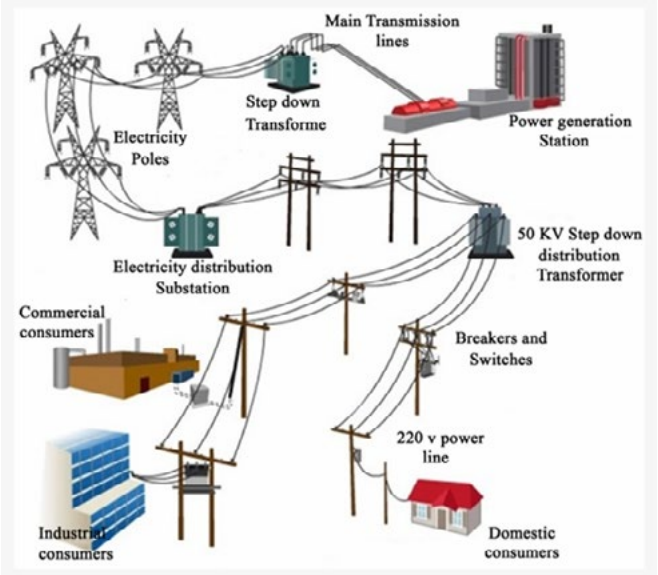
In the designing, operating and maintenance of electrical systems, the engineer must consider the health and safety hazards associated with electrical components as well as the safety of the surrounding community from fires, shocks and explosions.

Also included in the training are basic concepts of electrical systems require for both entry-level and experienced electrical professionals to effectively go about their duties on the job.

Training for:

Engineers and Technicians involved in the Process Industry and other allied industries who require an appreciation and deeper understanding of electrical systems and safety requirements associated with them.

Course Content:



- Electricity Basics
  - Ohm's law
  - Types of electrical faults
  - Overloads
  - Short circuits
  - Overcurrent Protective Devices
  - Interruption Rating
  - Current limitation
  - Fuses
  - Circuit Breakers
  - Circuit Protection Checklist
- An introduction to safety and some basic electrical engineering concepts
  - Introduction
  - Hazard control as a design criterion
  - Review of the fundamentals of electricity and circuits
- Electrical shock hazards and controls, and inadvertent activation of equipment
  - What is electric shock
  - Effects of shock on the human body
  - Shock hazards in special environments
  - Controlling the shock hazard
  - Conclusions regarding shocks
- Ignition of flammable and combustible materials and explosives
  - Introduction
  - Mechanics of fire
  - Characteristics of combustion
  - Explosions
  - Explosive atmospheres
  - Electrical phenomena as an ignition source
  - Methods to control ignition hazards
  - Overheating, damage to equipment, electrical explosions
- History of Electrical Safety
  - Electrical Safety Organizations
  - OSHA
  - General Duty Clause

GPE-1: Introduction to Electrical System and Safety (CONTD.)

- > NFPA, IEEE, NRTL, NEMA, ANSI, ANSI, ASTM and NECA
- > Professional liability.

» Electrical safety codes, standards and professional liability
- > Working on Deenergized equipment
- > Establishing a Safe work condition
- > Working on Energized equipment
- > Who is qualified?
- > Energized Electrical Work Permit
- > Employer and Employee responsibilities
- > Professional Liability

» Arc-Flash and Other Electrical Hazards
- > Arc-Flash and Arc-Blasts
- > Arc-Flash Metrics
- > Arc-Blast effect
- > Light and sound effects

» Systems safety analysis
- > Inductive method of system safety analysis
- > Deductive method of system safety analysis
- > Shock hazard analysis
- > Approach Boundaries
- > Flash Hazard analysis
- > Arc flash calculations and hazard calculation examples
- > IEEE 1584 Arc-Flash hazard calculation and NFPA 70E table method

» Minimizing Arc-Flash and Other Electrical Hazards
- > Design a safer system
- > Use and upgrade to current-limiting overcurrent protective devices
- > Implement an electrical safety program
- > Observe safe work practices
- > Use an energized electrical work permit
- > Use personal protective equipment (PPE)

Objectives:

- » Understand at a deeper level the fundamentals of electrical systems
- » Be more conscious of hazards associated with electrical systems
- » Understand different techniques of electrical hazard control
- » View an electrical shock from an anatomical perspective and understand how to prevent it.
- » Become aware of the mechanisms associated with electrical fire.
- » Get an historical perspective of electrical safety
- » Understand electrical codes and standards associated with electrical safety
- » Get a deeper understanding of the mechanism and mechanics of more serious electrical hazards like arc flashes and arc blasts
- » Become competent in analyzing electrical hazards.

Duration:

5 Days

GPE-2: Fundamentals of Electrical Drawings and Diagrams

Overview:

This course is designed to provide the knowledge of the various types of electrical diagrams used in the industry, and to develop the skills necessary to read, draw, and interpret these diagrams. With a basic grasp on understanding electrical diagrams, technicians and engineers are able to develop a logical pattern of troubleshooting that can aid in the successful analysis of systems.

Diagram analysis for troubleshooting electrical systems will be practiced. After completing this course, the trainee will possess a professional knowledge of different types of drawings, and diagrams, how to interpret them accurately and understand their purpose and flow.

Training for:

Anyone who works on or near power generation, transmission, or distribution systems should attend this course. Additionally, supervisors, managers, safety personnel, and those responsible for ensuring a safe work environment should attend this course.

Engineers and Technicians who are involved in the Process Industry and other allied industries who are responsible for the electrical power systems and electrical equipment also need the knowledge of electrical drawings to effectively carry out their duties.

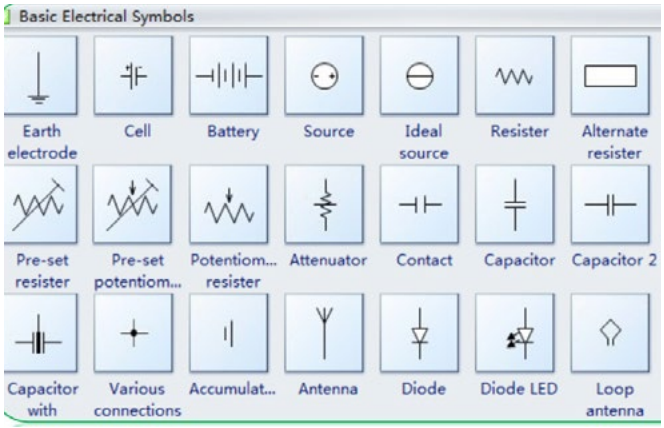
Course Content:

» Background
- > History of Electrical Blueprints
- > Computer Aided Drawing and Design
- > Maps
- > Purpose of Electrical Diagrams
- > Blueprint Page Layout

» Electrical Drawings
- > Drawings – relevance to engineering
- > Introduction to basic electrical drawings
- > Standards & their necessity
- > Drawings in plant engineering
- > Manufacturing organization
- > Typical engineering drawing & its parts

» Symbols And Terms
- > Switches
- > Symbols and abbreviations
- > Device Numbers

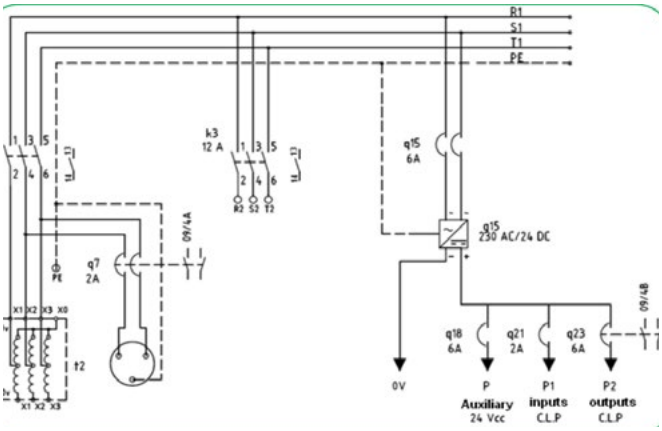
» Types Of Diagrams
- > Block, Wiring, Logic, Pictorial, Riser, IC Diagram.



- > Views
- > Construction wiring diagram
- > Site plans (Plan view)
- > Three-line diagrams
- > Interconnect wiring diagrams
- > Diagram scales
- > Schematics Circuit Diagram
- > Single Line Diagram or One-line Diagram
- > Electrical Floor Plan
- > Logic Diagrams

» Logic Diagrams
- > Control circuit diagrams
- > Applications of schematic diagrams
- > Purpose of schematic diagram
- > Cross-reference between coils and contacts
- > Logic diagrams & solid-state logic circuits
- > Logic gates – AND, OR, NOT, NAND, NOR and Exclusive OR

» Cabling, Wiring Layout and Cable Schedule
- > Different types of cabling drawings
- > Wiring diagrams
- > Example of cable routing schedule
- > Cable system drawings
- > Example for cable layout
- > Cable tray installation
- > Different types of wiring drawings
- > Cable schedule
- > Example of cable schedule, conduit schedule, cable tray schedule
- > Example of control cable interconnection
- > Conventions used
- > Practical exercise – wiring drawing



Duration:
5 Days

- > Conventions used for layout drawings

» CAD & Drawing Process Flow

- > Automated bill of material generation
- > Layers and their use in sharing information
- > Drawing management system
- > Planning & assigning of drawings
- > Drawing process flow and its steps
- > Revision control and ownership of the drawing
- > Introduction to CAD
- > Capabilities of CAD – editing, accuracy, storage & product design
- > Use of symbol & symbol libraries
- > Oil & gas application
- > Hazardous area zones in layouts

Objectives:

- » Draw detailed electrical diagrams of circuits and wiring diagrams/schedules, block diagrams,
- » Schematics, panel/board layouts, assembly and installation drawings, modification drawings, and conversion between drawing types
- » Identify components and materials from supplier/ manufacturer's catalogues
- » Design detailed electrical drawings
- » Draw sets professionally
- » Draft robust documentation
- » Produce final drafts for verification
- » Be able to handle critical issues as a result of increased troubleshooting competence borne out of improved electrical diagram interpretation acumen.
- » Utilize our case study sessions to gain practical knowledge that will give you an edge on the field.

GPE-3: Effective Maintenance, Troubleshooting & Repairs of Electrical Equipment

Overview:

This course equips engineering personnel with the right approach to troubleshooting without guessing or using trial & error method. It eliminates wastage on components parts thus allowing only defective components to be replaced in the course of troubleshooting. Participants will also learn about the operation of electrical control components, testing and interpretation of technical specification on these components.

Trainign for:

Electrical Technicians, Engineers, Supervisors and Electromechanical Technicians

Prerequisites:

Basic electrical knowledge

Among others, you will cover:

- Introduction to electrical troubleshooting using schematic diagram
- Legends interpretation
- Electrical Symbols identification / designators
  - Power symbol, Control symbol, Switches, Sensors, Meters, Output devices
- Basic layouts
  - Schematic diagram, Wiring diagram, Block diagram e.t.c
- Single-Line Diagram
  - Purpose of a single line diagram,
- Three-Line Diagram
- Practical exercise using schematic diagrams
- Electrical components identification, operation & testing
  - Contactors, Overload relay, Timer relay, Photo sensors, Proximity sensors, Push buttons and switches, Three phase induction motor, MCB/MCCB e.t.c
- Electrical measuring instrument
  - DMM, Phase sequencer, Clamp meter, Merger tester
- Five step approach for effective troubleshooting
- Fault categories
  - Short circuit and Open circuit
- Troubleshooting using simulator
  - Troubleshooting Motor control circuits -Simutech multimedia software
- Troubleshooting practice

Course Benefits:

At the end of this course, participants will be able to:

- Measure electrical parameters
- Understand Single line diagrams
- Understand three lines Diagrams
- Identify, use and test electrical control components
- Understand power and control of three phase motor control schematic diagrams.
- Understand 5 step approach to troubleshooting
- Troubleshoot and rectify electrical faults using schematic drawings.
- Identify, use and test electrical control components
- Demonstrate practical troubleshooting skill

Duration:

5 Days

GPE-4: Industrial Motor Control: Operation, Troubleshooting & Maintenance

GACA

Overview:

This course deals with working principle of a three phase AC induction motor and the various control techniques associated with its operation. Also, the ratings of fuses and settings of overloads for various sizes of an electric motor will be discussed.

Training for:

Engineers & Technicians, Plant Engineers and those with the mandate to supervise them.

Prerequisites:

Basic Electrical and AC motor knowledge

Course Content:

- Motor Selection, Maintenance, Testing & Replacement Motor Basics
  - Motor terminology, Types of motors and their suitable applications, Testing equipment, Field troubleshooting checklist, Motor selection, Nameplate data, IEC motor ratings, Energy considerations
- Safety Issues When Troubleshooting or Replacing Motors
- Procedures for Replacing a Motor
- Motor Maintenance
- Working with Control Circuits -Fundamentals of Control Circuits
- Motor Drives and Special Control Circuit Applications
  - Uses of 3 phase AC induction motors
  - Motor controller elements- operation and troubleshooting
- Electrical measuring instrument description and usage
  - Analogue meter
  - Digital Multi-Meter
  - Clamp meter
  - Megger meter
- Motor protection
  - Overload protection
  - Over current protection
- Other types of protection
  - Low voltage protection, Phase failure protection, Phase reversal protection, phase sequence control, Ground fault protection, Low voltage control
- Common problems with motor control circuit and their solutions.

Objectives:

- Identify the different types of motors and their appropriate applications
- Test for and troubleshoot motor problems
- Properly select and replace a motor
- Keep a motor properly maintained
- Identify and understand symbols used in common control circuit drawings
- Use a logical, systematic approach to troubleshooting
- Find and fix common control circuit problems

Duration:

5 Days

GPE-5: Fundamentals of Variable Frequency Drives

GACA

Overview:

This training course will cover the different areas of electric drives. From the different manufacturers to the different types of electric drives available and also how to choose the right one suited to your application. Also included in the training are: Installation, Parameterization and Commissioning,

Troubleshooting and special functions available with electric drives. This training course will ensure that engineers and technicians gain the highest level of knowledge in electric drives and on how to install, commission, service, operate, and troubleshoot them.

Training for:

Engineers and Technicians involved in the Process Industry and other allied industries who require an appreciation and deeper understanding of electric drive technology.

Course Content:

- Introduction to electric drives
  - What are electric drives
  - Why do we need Variable Frequency Drives?
  - Types of Variable Frequency Drives
  - How to select VFD for my Application
  - Manufacturers
  - VFD Draw backs & Solutions
- A brief overview of power electronic converters for drives
  - Voltage control – D.C. Output from D.C. supply
  - Controlled Rectification – D.C. from A.C.
  - Inversion – A.C. from D.C.
  - Cycloconversion – A.C. to A.C. but with different frequencies
  - Inverter switching devices
- Electric drive Connection, Commissioning and Troubleshooting
  - Safety and standards
  - Mechanical Installation
  - Electrical Installation and wiring
  - Parameterization and commissioning
  - Peripheral devices and options
  - Troubleshooting
  - Periodic Inspection and Maintenance
  - Four quadrant operation
  - Communications

- Motor/Drive selection
  - Power range for motors and drives
  - Load requirements
  - General application considerations

Objectives:

- At the end of the course, the participants should be able to:
- Identify the different types of drives and their applications
- Understand the basics of the underlying technology of drives
- Install and Commission drives
- Carry out maintenance on drives
- Understand Fault and alarm codes and Troubleshoot drive problems
- Properly select and replace a drive
- Find and fix common drive problems

Duration:

5 Days

GPE-6: Components of a Complete Power System: From Generation to Utilization

GACA

Overview:

This training course will familiarize students with the complete electrical power system architecture from generation all the way to utilization. Also included in the course is Power System Design, Short Circuit Analysis, Coordination Studies, Power Factor Analysis and power system harmonics study.

It is designed to address all facets of industrial power generation and distribution systems, including system planning, equipment selection, specification, application, system grounding, harmonic control, protection, conformity with electrical code requirements and power system maintenance. This program will also cover many in-class examples and problems for a hands-on learning experience.

Training for:

Engineers and Technicians involved in the Process Industry and other allied industries who require an appreciation and deeper understanding of electrical power systems and safety requirements associated with them.

Prerequisites:

Basic Electrical and AC motor knowledge

Course Content:

- History of the Electrical Power system
  - Ohm's law
  - Types of electrical faults
  - Overloads
  - Short circuits
  - Overcurrent Protective Devices
  - Interruption Rating
  - Current limitation
  - Fuses
  - Circuit Breakers
  - Circuit Protection Checklist
- Fundamentals of Electrical Power
  - Introduction
  - Hazard control as a design criterion
  - Review of the fundamentals of electricity and circuits
- Components of an Electrical Power system
  - Supplies
  - Loads
  - Transformers
  - Conductors
  - Capacitors and Reactors
  - Power Electronics
  - Protective Devices
  - SCADA systems
- Power System Design
  - Introduction to Electrical Power System Design
  - Electrical Safety Considerations
  - Economic Considerations of Design
  - Delta vs. Wye Configurations
  - Radial Distribution Systems
  - Networks
  - Electrical Codes and Standards
  - Double Ended Substation
  - Loop System
  - Selecting the Appropriate Voltage
  - Voltage Drop Calculations
- Power System Calculation and Sizing
  - Appliance Loads
  - General Lighting Load Calculations
  - Receptacles Load Calculations
  - Relevant Electrical Code Requirements

GPE-6: Components of a Complete Power System: From Generation to Utilization (CONTD.)

- Demand Factors
- Transformer sizing
- Conductor selection.
- Insulator type
- Breaker and fuse selection
- Switchboard bus rating
- Neutral and ground conductors
- Continuous vs. Non-Continuous
- Panel Schedules
- Hazardous locations
- Design case studies

» Power factor and harmonic analysis
- Power Factor Correction
- Power Factor Calculations
- Third Harmonics
- Utility Rate Structure
- Harmonic Related Problems
- Resonance
- Correction of Harmonic Problems
- Design of a 5th Harmonic Filter for an Industrial Plant

» Power Systems in Practice
- Residential Power system
- Commercial Power system

» Power System Management
- Fault management
- Maintenance and Augmentation
- Frequency and Voltage management.
- Power quality issues

Objectives:

» Understand power system design and analysis
» Evaluate harmonics and design harmonic filters
» Carry out maintenance of power systems
» Select and size power system components
» Conduct short circuit studies
» Become safety conscious when working with electrical power systems.
» Design electrical power systems more efficiently and effectively
» Calculate overcurrent device setting.

Duration:

5 Days

GPE-7: Electrical Switchgear Course

GACA

Overview:

This course covers the Efficient Operations and Maintenance of electrical switchgear. Switchgear units are critical in the protection and supply of electrical power in the manufacturing sector and in utility distribution systems as they serve to protect other equipment. Careless maintenance routines can lead to system inefficiencies and loss of system dependability.

There are many tools utilized in the maintenance of low, medium and high voltage switchgear today, therefore, it is important to know the differences in what to use when. This course is designed to educate learners with the fundamentals of operating and maintaining electrical switchgear and also enable maintenance managers and technicians to be aware of the importance of effective maintenance schedules for switchgear.

At the end of this course, learners will be able to go about planning and carrying out the maintenance activities of electrical switchgear efficiently.

Training for:

Engineers, Supervisors and other technical individuals who require a thorough understanding of switchgear and circuit breaker design, setup, inspection, testing, maintenance and overhaul in the discharge of their duties.Members of various industries including electricity and utility, Ministry of Power, etc.

Engineers and Technicians who are involved in the Process Industry and other allied industries who are responsible for the electrical power systems and electrical equipment.Any professional who interacts with switchgear, circuit breakers or power transformers in any manner will benefit from this course.

Course Content:

» Introduction to Electrical Switchgear
- > Switchgear fundamentals
- > Installation and maintenance guidelines
- > Switchgear components: enclosures, conductors, switches, fuses, isolators, interrupting
- > Chambers, circuit breakers, relays, interlocks, racking Operations, control panels, lightning arrestors,
- > Types of breakers
- > Fuse switches
- > Primary & back-up relaying
- > Fault calculation
- > System earthing

- > Fuses as alternatives to circuit breakers
- > Auto-reclosers and auto-reclose operation

» Application of Switchgear
- > The history of switchgear
- > Principles of current interruption
- > Plain break circuit breakers
- > Bulk and small oil volume circuit breakers
- > Operating mechanisms
- > Transfer earth circuit breakers
- > Fixed and withdraw-able designs
- > Switchgear guidelines
- > Switching procedures. Automatic Transfer Scheming, Interlocks, Monitoring
- > Factors affecting switchgear selection

» Specification of Switchgear
- > Switchgear types (Low voltage, MV & High Voltage), design specifications, component configurations, Assembly
- > Easy and complex protection systems
- > Switchgear ancillaries, current transformers, potential transformers, instrument transformers, relays and various associated equipment
- > Substation and switch room layouts and design
- > Substation compound
- > Metal-clad switchgear maintenance
- > Symmetrical and asymmetrical breaking
- > Make and break operations
- > Cable terminations
- > Indoor and outdoor operation
- > Interpretation of test oscillograms

GPE-7: Electrical Switchgear Course (CONTD.)

- Installation of different types of circuit breakers, Oil circuit breaker, Air Blast circuit breaker, SF6 circuit breaker, Vacuum circuit breaker.

» Safety Policies
- Overall safety measures and the importance of personal protective equipment (PPE)
- Values of safety rules
- Principles of personal authorization
- Live training for the safe operation of switchgear
- Isolation in a circuit breaker context
- Safety documentation
- Operative and safety locking and danger notices
- Work safety in a substation environment
- Safety interlocks
- Substation alarms
- Individual study tasks and presentation

» Operating of Contemporary Switchgear
- Principles of time and condition-based asset management
- Asset registers
- Asset management systems
- Case studies (ABB, Schneider etc.)

» Diagnostics, Testing And Maintenance
- Switchgear inspection methodologies
- Partial discharge measurement and survey
- Timing tests
- Mechanisms of deterioration
- Circuit breaker diagnostic techniques
- Mechanical & Electrical operations of switchgear, Switchboard inspections, Grounding
- Principles of circuit breaker maintenance
- Maintaining oil circuit breakers
- Case study (circuit breaker settings, selectivity, sensitivity, speed)
- Contact maintenance and contact wipe
- Oil testing
- Maintaining vacuum circuit breakers
- Batteries – condition and monitoring
- Switchgear defects and defect control methods

Objectives:

» Describe the basics of operating switchgear and circuit breakers
» Select suitable types and ratings of circuit breakers and switchgear
» Understand the functions of switchgear components (CTs, VTs, relays and cable terminations)
» Set up simple and effective transformer protection schemes
» Specify switchgear maintenance and testing procedures and strategies.
» Implement switchgear asset management and testing.
» Understand circuit breaker control circuits and their structure of control circuits
» Understand the types and applications of protective relays and the use and applications of current and voltage transformers
» Match the characteristics of a circuit breaker to particular protection control circuits, and also determine the selectivity, sensitivity and speed of the control circuits
» Develop simple operational protocols to assure safety while working with electrical switchgear.

Duration:

5 Days

GPE-8: ELECTRICAL SYSTEM MAINTENANACE, MEASUREMENT AND TROUBLESHOOTING

GACA

Overview:

Optimum efficiency, reliability and longevity of electrical equipment such as the motors, VFDs, transformers, generators, inverters, UPS, circuit breakers, fuses, etc. is of great concern to many industries. Only a good understanding of the characteristics, selection criteria, common problems, repair techniques and the proper maintenance regimen can keep electrical equipment working at their optimum.

This Electrical System Maintenance, Measurement and Troubleshooting training course provides students with the requisite skills to take advantage of the latest technology in the troubleshooting and maintenance of electrical equipment. It also explains how equipment operate, important measurements and provides guidelines and rules that must be followed for their successful operation. Their basic design, measurements, operating characteristics, specification, selection criteria, as well as all maintenance issues are covered in detail.

Training for:

Both developing engineers & experienced electrical personnel working within commercial and heavy industrial environments cutting across Food and Beverages, Oil and gas, Primaries (mining, metals, cement), power and energy, water and waste water, life sciences, pulp and paper, renewable energy and many more. The training course provides personnel with the knowledge and competence to perform quality maintenance, installation, testing and inspection of generic electrical plant & equipment.

Engineers and Technicians who are involved in the Process Industry and other allied industries who are responsible for the electrical power systems and electrical equipment.Any professional who interacts with switchgear, circuit breakers or power transformers in any manner will benefit from this course.

Course Content:

» Troubleshooting Principles and Commissioning of Electrical Equipment
- > Introduction to electrical troubleshooting and maintenance
- > Basic principles of using wiring diagrams and electric meter in troubleshooting circuits
- > Checks for circuit continuity with disconnected and live circuits
- > Tests and methods
- > Testing devices
- > Equipment Commissioning

» Fundamentals of Test Equipment
- > Why carry out measurements
- > History of measuring instruments
- > Types of Test Equipment
- > Best practices in measuring
- > Standards and ratings of Test equipment
- > Precautions when taking measurement

» Maintenance
- > Types of Maintenance
- > Impact of Maintenance
- > Role of maintenance organization
- > Maintenance Improvement
- > Condition Monitoring
- > Scheduling Maintenance
- > Safety in Electrical Maintenance

» Condition Monitoring for Electrical Equipment
- > Approaches Based On Mathematical Models
  - ☑ Reliability Centered Maintenance (RCM)
  - ☑ Condition Based Maintenance (CBM)
  - ☑ Partial Discharge
- > Insulation Resistance Monitoring
  - ☑ Insulation resistance testing
  - ☑ Dielectric Absorption Ratio test
  - ☑ Polarization index test
  - ☑ Dc hi-pot test
  - ☑ Tracking insulation degradation
  - ☑ Insulation power factor
- > On-line measuring partial discharge activity for insulation
- > On-Line Monitoring of Transformers
  - ☑ Local Indications

GPE-8: ELECTRICAL SYSTEM MAINTENANACE, MEASUREMENT AND TROUBLESHOOTING (CONT'D)

- ☑ Thermography
- ☑ PDA – Partial Discharge Analysis
- ☑ Insulating Oil Properties and Tests
- ☑ Oil Dielectric Strength test
- ☑ Oil water content
- ☑ Acidity Test (Neutralization Number)
- ☑ Oxidation Inhibitor
- ☑ Interfacial Tension Test (IFT)
- ☑ Oil Color
- ☑ Insulating Oil Dissolved Gas Analysis (DGA)
- ☑ Cable thermal behavior after installation

» Problems due to earthing
- > Equipment Earthing
- > System Earthing
  - ☑ Problems due to unearthed systems
  - ☑ Solid earthing
  - ☑ Resistance earthing
  - ☑ Reactance earthing
- > Earthing Via Neutral Earthing Compensator
  - ☑ Distribution transformers
  - ☑ Zig Zag transformers
- > Comparison of Methods (Advantages/Disadvantages)
- > Evaluation of earthing methods
  - ☑ Testing the earthing electrode Resistance

» Fundamentals of Generator Maintenance, Testing and Trouble Shooting
- > Basic Electrical Generator Principles
  - ☑ AC Generators
  - ☑ Generator excitation and voltage control
  - ☑ Diesel generator sets
  - ☑ Synchronizing of generators
  - ☑ Load sharing
  - ☑ Load shedding
- > Preventative Maintenance
- > Trouble Shooting
  - ☑ General troubleshooting Procedure
  - ☑ Generator Does Not Produce Voltage
  - ☑ Generator Produces Low Voltage
  - ☑ Generator Produces High Voltage
  - ☑ Generator Voltage Fluctuating
- > Fault analysis for Generator Control Circuit

» Motors Fundamentals, Maintenance, and Troubleshooting
- > Fundamentals of Electric motors
  - ☑ Types of A.C Electric Motors
  - ☑ Principles of Operation of the Induction Motor
  - ☑ Enclosures and Cooling
  - ☑ Power for induction motors
  - ☑ Starting of Induction Motors
  - ☑ Motor Operation at Reduced Voltage
  - ☑ Power Factor Correction
- > Motor Testing
- > Common Causes of Motor Failure
- > Troubleshooting of Electrical Motor Control Circuits
- > Latest trends in Motor Testing and Measurement technology.

» Circuit Breaker Fundamentals, Maintenance, Service, Testing and troubleshooting
- > The purpose of electrical switchgear
- > The safe operation of electrical switchgear
- > Fundamentals of CB Maintenance
  - ☑ Air Circuit Breakers.
  - ☑ Vacuum Circuit Breaker
  - ☑ SF6 Circuit breaker
  - ☑ Trip Circuit Supervision
  - ☑ Circuit-Breaker Control
  - ☑ Low Voltage Molded Case Current Limiting Circuit Breakers
  - ☑ Protective Devices (Fuses, MCBs & RCDs)
  - ☑ HV Circuit Breakers Maintenance
  - ☑ HV Circuit-Breakers Tests
  - ☑ Low Voltage Circuit Breaker Maintenance Diagnostics, Testing And Maintenance

» Transformer Fundamentals, Maintenance, Testing and Troubleshooting
- > Principles of Transformers
  - ☑ Saturation Curve & Voltage Ratio of Transformers
  - ☑ Current Ratio & Impedance of Transformers
  - ☑ Transformer Construction
  - ☑ Transformer losses and efficiency
  - ☑ Transformer Cooling & Types
  - ☑ Transformer Polarity
  - ☑ Transformer Accessories
- > Preventative Maintenance For Transformers
  - ☑ Transformer Inspection
  - ☑ Transformer Oil tests
  - ☑ General Testing
  - ☑ Other Important Tests
  - ☑ Common Causes of Transformer Failure
  - ☑ Disassembly for Inspection
- > Common Transformer Abnormalities

» UPS, Rectifiers, Inverters and Batteries Fundamentals Maintenance, Testing and Troubleshooting
  > UPS Fundamentals
    ☑ Rectifiers & Inverters
    ☑ Batteries and Battery Charging
    ☑ Battery Charging Tests
    ☑ Safety During Battery Charging
    ☑ Precautions to note when working with batteries
  > Battery discharge test.
  > Troubleshooting Guide

Duration:
5 Days

Objectives:

» Comprehend the hazards associated with working with electrical power systems.
» Perform safe electrical switching operations on all switchgear and associated equipment in preparation for maintenance tasks.
» Understand what constitutes correct working methodology and safe operation when working on electrical equipment, switchgear in electrical distribution systems in production plants.
» Understand diagnostic testing and inspection, advanced fault detection techniques, critical components, and common failure modes.
» Study selection criteria, commissioning requirements, predictive and preventive maintenance, reliability, testing and cost.
» Discover the maintenance required to minimize operating cost and maximize efficiency, reliability and longevity.
» Understand industrial best practice when working with specific electrical equipment like Generators, Transformers, Electric Motors, UPS, Inverters, Batteries etc.

GPE-9: Introductions to Cable Wiring, Earthing and Electrical System Protection

Overview:

In a power system, there are different types of electrical cables that differ in configuration, size and utility. The selection of proper electrical cable is crucial in installation of equipment as it comes with specific voltage rating and current consumption rate. A standard power system is not complete without earthing protection as they are prone to deficiencies.

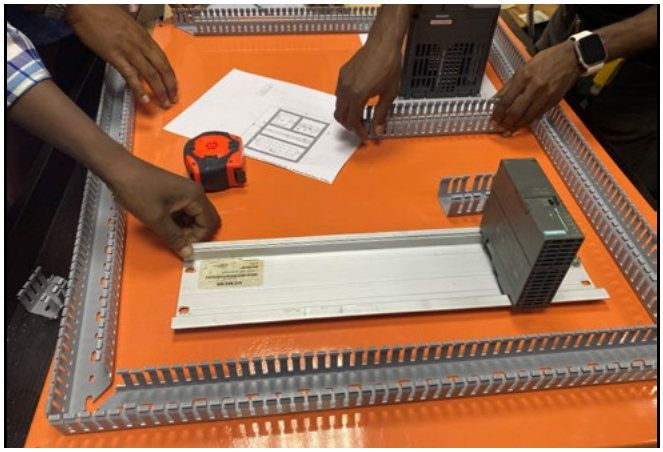
Due to the instability caused by faults in power systems, It is crucial to identify the point of fault accurately and trip only those segments affected by the error while the rest of the structure can continue to run naturally.

This course is an introductory course for wiring, earthing and electrical power system protection. It aims to give a comprehensive up-to-date presentation of the role of power protection systems, wiring and its advances in modern power system.

Training for:

Electrical Engineers, Supervisors or Technicians responsible for the maintenance of power systems and electrical protective gear whether new to the industry or experienced. Personnel who generally work with electrical equipment will also benefit from this course.

Course Content:



- » Overview of power systems
  - > Reading single line diagrams
  - > Equipment per-unit calculations
  - > Symmetrical components
- » Introduction to Cables and wiring
  - > Electrical Conductors, Data cables, Optical fiber
  - > Low voltage cables, High voltage cables, Super tension cables, Extra High Voltage cables, Extra Super Voltage cables
  - > Reading Electrical Wiring Diagrams
  - > Cable conductors & suitability, Cable joints and terminations
  - > Cabling and Switch-gear
  - > Hi voltage and Low voltage networks
  - > Cable sizing: Electrical measurement devices and Load Calculation tools
- » Introduction to Earthing and Earthing Design
  - > Earthing/Grounding Basics
  - > The earth electrode
  - > Basics of Earthing system design
  - > How Earthing Design can ensure human safety in high-voltage environments
  - > The impact of lightning strikes on Earthing Systems
  - > Earth testing
  - > Soil resistivity
  - > Earth fault theory, safety and hazards
  - > Earthing design criteria
  - > Earthing standards
  - > Earth resistance
- » System Earthing and Earth Faults
  - > Effect of electric shock on human beings
  - > How to properly connect Earthing system electrodes and conductors
  - > Resistance-to-Earth testing
  - > Earthing Theory
  - > Hot and Cold Site Theory
  - > Soil Resistivity testing
  - > Principle of Residual Current Device
  - > Testing the RCD
  - > Drawbacks of RCD Wiring of RCD
  - > Sensitive earth leakage protection
  - > Phase and earth faults
  - > Comparison of earthing methods
- » Fundamentals of Protection in power systems
  - > Basic components of power system protection
  - > Requirements
  - > Need for power system protection
  - > Basic circuit breaker protection design
  - > overcurrent relays
  - > Electromechanical relays
  - > Microprocessor-based relay protection
  - > The future of Power system protection

GPE-9: Introductions to Cable Wiring, Earthing and Electrical System Protection (CONTD.)

- Categories of Faults and Short Circuit Currents
  - Symmetrical units
  - Unbalanced faults and earth faults
  - Calculation of short circuit MVA
  - Fault-types, effects and calculations
- Circuit Breakers with Built-in Protection
  - Circuit breakers with in-built protection
  - Conventional and electronic releases
  - Fuse operating characteristics, ratings and selection
  - Performance under fault conditions
  - Protective relay-circuit breaker combination
- Relays and Auxiliary Power Apparatus
  - Theory of construction and operation of protective relays
  - Why breakers and contactors fail to trip
  - Universal microprocessor overcurrent relay
  - Future of protection for distribution systems
  - The necessity for consistent auxiliary power for protection systems
  - Trip circuit supervision
  - Capacity storage trip units
- Safety of Feeders and Lines
  - Use of carrier signals in line protections
  - Over-current and earth fault protection
  - Unit and impedance protection of lines
  - Auto-reclosing relays for transmission and distribution lines
  - DMT and IDMT arrangements applied to sizeable systems
  - Temporary faults and use of auto reclosing as a means of reducing outage time
- Protection of Machinery
  - Motor protection basics
  - An introduction to generator protection
  - Transient and steady-state temperature rise
  - Typical protective settings for motors
  - Thermal time constant
  - Unbalanced supply voltages

Objectives:

- Comprehend the hazards associated with working with electrical power systems.
- Identify instrument transformers for protection applications
- Understand the principles of overcurrent protection systems
- Understand how electromechanical relays work
- Design protection schemes for power systems.
- Understand industrial best practice when working with specific electrical equipment like Generators, Transformers, Electric Motors, UPS, Inverters, Batteries etc.
- Understand the need for earthing electrical systems and how earthing works.
- Understand electrical cable sizing, testing and installation.
- Know the different types of cables and their uses.
- Understand how to carry out proper maintenance of electrical systems and protective devices.

Duration:

5 Days

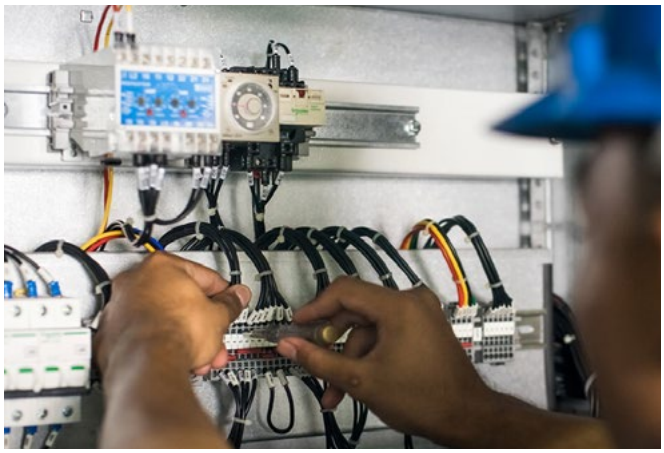
GPE-10: Electrical Inspections, Installation, Testing and Commissioning

GACA

Overview:

An equipment is not ready for commercial service until it is proven by testing all its functions under different conditions. This is key for satisfactory operation of electric systems. Any errors missed in the previous stages of a project are discovered during commissioning.

This course is designed to give a clear understanding of the principles of electrical installation, commissioning and testing. It will also prevent injuries and damages during commissioning as trainees will fully understand the processes and plan all steps for the commissioning process.



Training for:

Both developing engineers & experienced electrical personnel of different cadres like safety professionals, project engineers, engineering managers, maintenance engineers and technicians working within commercial and heavy industrial environments cutting across Food and Beverages, Oil and gas, Primaries (mining, metals, cement), power and energy, water and waste water, life sciences, pulp and paper, renewable energy and many more.

It is especially important for personnel directly engaged in installation, commissioning and testing of electrical equipment. The training course provides personnel with the knowledge and competence to effectively perform installation, inspection, testing and commissioning of electrical plant & equipment.

Course Content:

» Importance of Start-Up, Commissioning and Testing of Electrical Systems
- > Reasons for Start-up, Commissioning and Testing
- > Managing Commissioning with the appropriate standards: Statutory Test and Inspection
- > Earthing System including Clean Earth, Intrinsic Safe Earth and Planet Earth
- > Major Components of GIS Substations
- > GIS with Vacuum Interrupter
- > Documentation and Deliverables

» Basics of Installation, Commissioning and Testing
- > Fundamentals of Electrical installation
- > Consulting the Manufacturer's documentation
- > Principles of electrical cabling
- > Start-up, Commissioning and Testing
- > Inspection before Test
- > Safety in electrical testing
- > Pre-commissioning Procedures
- > Pre connection and post connection tests
- > Testing and commissioning procedures
- > Sequence of Tests
- > Periodic testing
- > Substation Commissioning
- > Functional performance tests
- > Safety considerations
- > Statutory requirements
- > Installation in hazardous environments
- > Notification of Completion
- > Preliminary Steps for Power Energization
- > Power Energization
- > Switch On Process

» Commissioning Test Equipment, Circuit Breakers and Instrument Transformers
- > Types of Tests and Equipment for Commissioning
- > R test, Primary Injection Test, Secondary Injection Test
- > HV Test, AC Hipot Test, DC Hipot Test and Connections
- > Infrared and Partial Discharge Monitoring
- > Circuit Breaker Functional Tests
- > Tests for SF6 Circuit Breaker
- > SF6 Management
- > Construction and Test for Current Transformer and Voltage Transformers

» Commissioning Test Equipment for Transformers Integrity
- > Transformer Noise
- > Commissioning Test and Test Equipment for Power Transformers
- > Functional Tests for Power
- > Transformer

GPE-10: Electrical Inspections, Installation, Testing and Commissioning (CONTD.)

- Vector Group of Transformer
- Transformer Oil Characteristics and Tests
- Sweep Frequency Response Analysis (SFRA) Test Significance
- Tan Delta Test and Polarization Index
- Transformer Protection with Multi-Functional Numerical Relays Electromechanical relays
- Microprocessor-based relay protection
- The future of Power system protection

» Commissioning Test for Earthing and Lightning Systems
- Importance of Earthing
- Network Earthing
- Neutral Earthing Resistors
- Restricted Earth Fault
- Sensitive Earth Fault
- Lightning Protection Systems
- Commissioning Testing for Protection
- Numerical Relays Functionalities

» First Energization and Commissioning Documentation
- Battery Charger Commissioning Tests
- Commissioning Switching Plans
- Managing the First Energization
- Switching Plans
- Soak Tests and Phasing Tests
- Commissioning Certificates

COURSE OBJECTIVES

Upon completing this course successfully, participants will be able to:

» Identify, select, install, operate, test, troubleshoot and sustain various types of electrical equipment
» Understand the testing process
» Perform investigative testing and inspection of critical components and identify common points of failure for electrical equipment
» Plan and prepare for testing
» Visually inspect electrical installations and identify faults.
» Perform on load and offloads tests
» Employ calculated selection criteria for commissioning prerequisites, prognostic and preemptive maintenance, and cost estimation for electrical equipment
» Bear in mind safety aspects during testing
» Execute maintenance techniques required to minimize operating cost and maximize the productivity, reliability and durability of electrical equipment
» Plan and carry out inspections
» Plan the first energization
» Consider safety during testing

Duration:

5 Days.

CIES: Certificate in Industrial Electrical System

Overview:

This practical hands-on Industrial Electrical course will develop a candidate's competency to deal safely and efficiently with electrical and plant related issues at an introductory, intermediate and professional levels. It is a professional development course designed for engineers and technicians who need to understand the basics of electrical engineering, the fundamentals of electrical design, and how to integrate electrical engineering knowledge into the other technical fields as applicable to major industries.

The attendees shall be exposed to the fundamental principles of electrical generation, transmission, and distribution. The concept of electrical measurements, as applied to single-phase and three-phase systems, electrical system and component troubleshooting and many more shall be covered.

Course Content:

The following are the modules to be covered during the course of this training:

- **MODULE 1:** Introduction to Electrical System and Electrical Safety
- **MODULE 2:** Components of a Complete Power System: From Generation To Utilization
- **MODULE 3:** Fundamentals of Electrical Drawings and Diagrams
- **MODULE 4:** Overview of Electrical Switchgear
- **MODULE 5:** Electrical Installation, Inspection, Testing and Commissioning
- **MODULE 6:** Introduction to Cables, Wiring, Earthing and Electrical System Protection
- **MODULE 7:** Electrical System Maintenance, Measurement and Troubleshooting.
- **MODULE 8:** Industrial Motor Control: Operation, Troubleshooting & Maintenance

Course Benefits:

Among other, at the end of this course, the attendees shall be able to;

- Test electrical systems to narrow down a problem area.
- List electrical hazards when testing live systems and list ways to minimize hazards.
- Use electrical schematics to navigate a system effectively.
- Carry out LOTO procedures correctly.
- Describe the operating principle of fuses, MCBs and RCDs.
- Wire up, test and operate a range of different electrical circuits using standard electrical components.

- Ensure that all cabling, connections and operating standards are met for each circuit.
- Ensure that this competency yields a clear understanding of how electrical plant operates and is
- tested in industry.
- Competently use multi-meters and grip-ons to test systems.
- Wire and test 3-phase motor circuits controlled by contactors and overloads.
- Demonstrate how to troubleshoot a range of common faults on work- based technology.

Duration:

2 Months

Greenpeg Object- Oriented Programming Courses

GPP-1: C++ Programming - Introductory Course

Overview:

This course is designed for C programmers and those that aspire to be a user of C++ programming language. It will allow participants to experiment with design features through exercise programs.

Starting with a presentation of C++ as a better C, the course explores function prototyping, the IOStream Library and operators, references, default arguments, structure types. The basis of data abstraction is the C++ class with operator and function overloading. Once the features and syntax of the class construct in C++ are mastered, students are introduced to the methodology of object-oriented design and programming.

The application of these concepts will in turn lead to more advanced uses of C++, including inheritance, parameterization (template classes), and dynamic binding.

Example C++ programs and program fragments as well as assigned exercises augment the lecture material.

Course Content:

- » Introduction
  - > Object- oriented fundamentals
    - ☑ Programming paradigms
    - ☑ Conquering complexityMaintenance
  - > C++ Basics
    - ☑ Built-in types, arrays and pointers
    - ☑ Comments, keywords, I/O streams
    - ☑ Built-in operators and control constructs
    - ☑ Dynamic free store operators
    - ☑ Safety in Electrical Maintenance
  - > C++ Function
    - ☑ Definition and prototypes
    - ☑ Inline functions
  - > Structures and references
- » Classes And Objects
  - > Encapsulation
    - ☑ Data members, member functions
    - ☑ Private and public
  - > Constructors and destructors
    - ☑ Default arguments
    - ☑ Storage allocation and deallocation
    - ☑ This pointer

- » Overloading
  - > Overloading Functions and Operators
    - ☑ Unary and Binary operators
    - ☑ Initialization vs. assignment
    - ☑ Stream input and Output
- » Polymorphic Programming
  - > Inheritance
    - ☑ Public inheritance and subtyping
    - ☑ Base and derived classes
    - ☑ Constructors and destructors
    - ☑ Base class initialization
  - > Virtual functions
- » Base class pointers and references
  - > Dynamic binding
    - ☑ Abstract base classes
    - ☑ Pure virtual functions
- » Code Reuse In C++
  - > Containment
    - ☑ Objects as data members
    - ☑ Member initialization
  - > Private inheritance
    - ☑ Base and derived relationship
    - ☑ Access declarations
- » Designing with C++
  - > Templates
    - ☑ Template functions & classes
  - > Exceptions
    - ☑ Try, catch, throw
    - ☑ Exception hierarchies

Duration:
5 days.

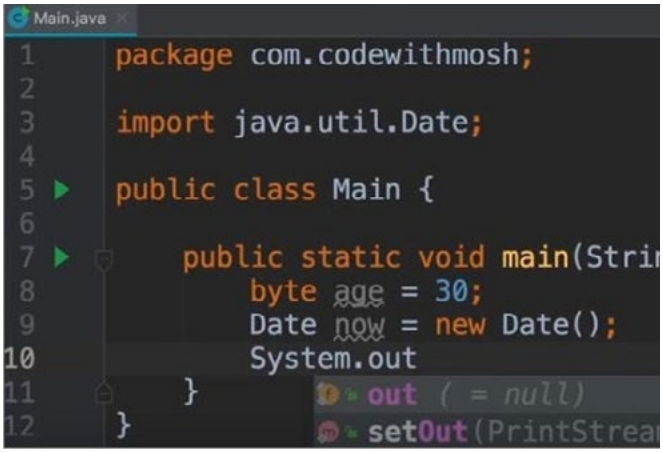
GPP-2: JAVA Programming - Introductory Course

GACA

Overview:

This Java Programming course provides extensive experience with Java and its object-oriented features. It is intensive and hands-on; the course emphasizes becoming productive quickly as a Java programmer. You use Java to create both console and GUI applications.

Besides learning the basic structure and syntax of the language, attendees will also learn about object-oriented principles and how they are applied in real Java applications. You build robust applications using Java's object-oriented features as well as develop platform-independent GUIs. You also learn to read and write data using Java streams.



Prerequisites

Three to six months of experience in a high-level programming language such as C, Pascal, Python or Visual Basic.

Course Content:

» Course Introduction
- > Basic of Java
- > How to Get Java
- > First Java Program [Hello World!]
- > Compiling and Interpreting Applications
- > Compiling source code into bytecode
- > Stand–alone applications and servlets
- > Overview of class libraries
- > The JDK Directory StructureStructures and references

» Java Development Tools
- > Java Development Kit (JDK)
- > Compiler (javac)
- > Javadoc and Java Archive (JAR) utility
- > Java Integrated Development Environment (IDEs)
- > Introduction and installation of Eclipse
- > Editors, Views, and Perspectives
- > Setting up a Project
- > Creating, Running and Debugging a Java Application
- > Importing Existing Java Code into

» Datatypes and Variables
- > Primitive and Non-Primitive Datatypes
- > Declaring and Initializing Variables
- > Numeric and Character Literals
- > String and String Literals
- > Declaring and using Arrays
- > Upcasting, downcasting and autoboxing
- >

» Operators and Expressions
- > Expressions
- > Assignment, Arithmetic, Relational, Logical, Increment & Decrement, Conditional, Cast, dot and Operate-Assign Operators (+=, etc.)
- > Implicit Type Conversions Private inheritance

» Flow Control
- > Conditional (if) Statements, adding an else if, conditional (switch) Statements, while and do-while Loops, For Loops, continue Statement and break Statement

» Methods
- > Invoking methods and passing parameters
- > Method Parameters
- > Scope
- > Handling exceptions with try and catch

» Object-Oriented Programming
- > Instantiating objects from classes
- > Fields and Methods
- > Encapsulation Inheritance and Polymorphism
- > Designing an OO application step by step

» Objects and Classes
- > Creating an Object
- > Instance Data and Class Data
- > Extending existing classes
- > Aggregation and composition
- > Overloading and overriding methods
- > Constructors and Encapsulation

» Using Java Objects
- > Print Format Strings
- > StringBuilder and StringBuffer
- > Methods and Messages
- > toString

- Parameter Passing
- Comparing and Identifying Objects

» Inheritance in Java
- Casting
- Polymorphism

» Advanced Inheritance and Generics
- Abstract Classes
- Using Interfaces
- Collections, Generics and Comparable

» Exception Handling
- Declaring & Catching Exceptions
- Exception Methods
- Defining and Throwing Exceptions
- Errors and Runtime Exceptions

» Input/Output Streams
- Overview of Streams
- Bytes vs. Characters
- Converting Byte Streams to Character
- File Object
- Binary Input and Output
- PrintWriter Class
- Reading and Writing Objects

» Core Collection Classes
- The Collections Framework
- The Set Interface and Set Implementation Classes
- The List Interface and List Implementation Classes
- The Queue Interface and Queue Implementation Classes
- The Map Interface and Map Implementation Classes

» Foundations of user interfaces
- Basic GUI widgets
- Event-driven programming
- Benefits of a portable windowing library

Course Objectives

» Obtain a solid foundation in Java programming concepts.
» Identify Java language components and how they work together in applications.
» Fully understand the OOP (Object Oriented Programming) concepts.
» Learn how to implement object-oriented designs with Java
» Learn why Java is useful for the design of Desktop and web applications.
» Design and program stand-alone Java applications.
» Learn how to read and write files in Java
» Understand how to use Java APIs for program development.
» Learn to extend Java classes with inheritance and dynamic binding.
» Learn to design a GUI (Graphical User Interface) with Java Swing.
» Understand how to design applications with threads in Java.
» Learn Java generics and how to use the Java Collections API.
» Learn to use exception handling in Java applications.

Duration:
5 days.

GPP-3: Python Programming - Introductory Course

Overview:

This Java Programming course provides extensive experience with Java and its object-oriented features. It is intensive and hands-on; the course emphasizes becoming productive quickly as a Java programmer. You use Java to create both console and GUI applications.

Besides learning the basic structure and syntax of the language, attendees will also learn about object-oriented principles and how they are applied in real Java applications. You build robust applications using Java's object-oriented features as well as develop platform-independent GUIs. You also learn to read and write data using Java streams.

Prerequisites

Three to six months of experience in a high-level programming language such as C, Pascal, Python or Visual Basic.

Course Content:


```
#modeling the person class
class Person():
#method to initialize name and age attributes.
    def __init__(self,name, age):
        self.name = name
        self.age = age
#method to demonstrate what a person eats
    def eat(self):
        print(self.name.title() + "eats Matooke and rice")
        print("She is"+ str(self.age) + " years old")
    def drink(self):
        print("Drinks water")
#instantiating a class.
my_sister = Person("Haniita", 30)
#Accessing the class method through the class object.
my_sister.eat()
```

» Introduction to Python
  > Python History and Versions
  > Documentation and Resources
  > Python Implementations
  > Getting Python
  > Getting Eclipse
  > Installing the PyDev Plugin
  > Python(x,y) – Python for Scientific Computing
  > Create a Test Spyder Project
» The Python Environment
  > Different Ways to Run Python
  > IDLE
  > The Python Shell (and IPython)
  > Running Python from Eclipse
  > Introduction to Debugging on Eclipse
  > Debugging – Stepping Through Code
  > Passing Command Line Arguments
  > Accessing Command Line Arguments
» Python Data Types
  > Identifiers
  > Naming Conversions
  > Keywords and Built-ins
  > The Garbage Collector
  > Unicode Strings
  > String Functions
  > Formatting Strings
  > Capturing Input and Handling Data Conversion
  > Data Structures: Sequences, Sets, and Dictionaries
  > Functions, Files and Classes
» Working with Data Structures
  > Sequences, Lists, List Operations
  > The range() and xrange() Functions
  > Tuples
  > Looping through Sequences, Slicing Sequences, Comparing Sequences
  > Dictionaries, Dictionary Operations
  > Sets
  > Complex Data Structures
  > Deep vs. Shallow Copy
» Working with Modules
  > Importing Modules
  > PYTHONPATH
  > Packages
  > Compiled Python Code
  > Python Standard Modules
  > dir() and help()
  > Finding and Installing Modules
  > Installing pip
  > Installing and Upgrading Modules with Pip

- > More pip Operations

» Program Structure
- > Statements, Comments
- > Joining Lines, Indentation
- > Operators, Operator Precedence
- > If Statements
- > Evaluating Variables
- > While Loops, For Loops
- > Tuple Assignment with For Loops
- > Pass

» Functions
- > Introduction to Functions
- > Function Parameters and Default Arguments
- > Positional vs. Named Notation
- > Passing by Value vs. Reference
- > Unpacking Positional Arguments, Unpacking Named Arguments
- > Overloading Functions
- > Returning Data from Functions
- > Function Variable Scope
- > Global, globals(), and locals()
- > Documentation Strings in Functions

» Exception Handling
- > Exception Handling with try…except
- > Else and Finally
- > Exception Class Inheritance Hierarchy
- > Handling Multiple Exceptions
- > Explicit Exception Raising
- > Re-raising Exceptions
- > Custom Exception Classes

» Built-in Functions and Modules
- > Built-in Functions
- > The Python Standard Library
- > The sys Module
- > The os Module
- > The Logging Module
- > Logging – Configuring the Output
- > Log Record Attributes
- > The datetime Module
- > Time Formats
- > The sched Modules

» Working with Files
- > Reading from Files
- > Reading Lines from Files
- > Reading JSON from Files
- > Writing and Appending to Files
- > Using "with" to Manage Resources
- > File Attributes
- > Python Classes

» Introduction to Object-Oriented Python
- > Creating Your First Class
- > Inheritance
- > Multiple Inheritance and Method Resolution Order
- > Accessing Attributes
- > Superclass Methods
- > Method Overloading
- > Class Attributes
- > Static and Class Methods
- > Unit Testing
- > Introduction to Unit Testing
- > The unit test Module
- > Assertions
- > Test Suites
- > Hands-on Lab Exercises

Course Objectives

Students will learn how:

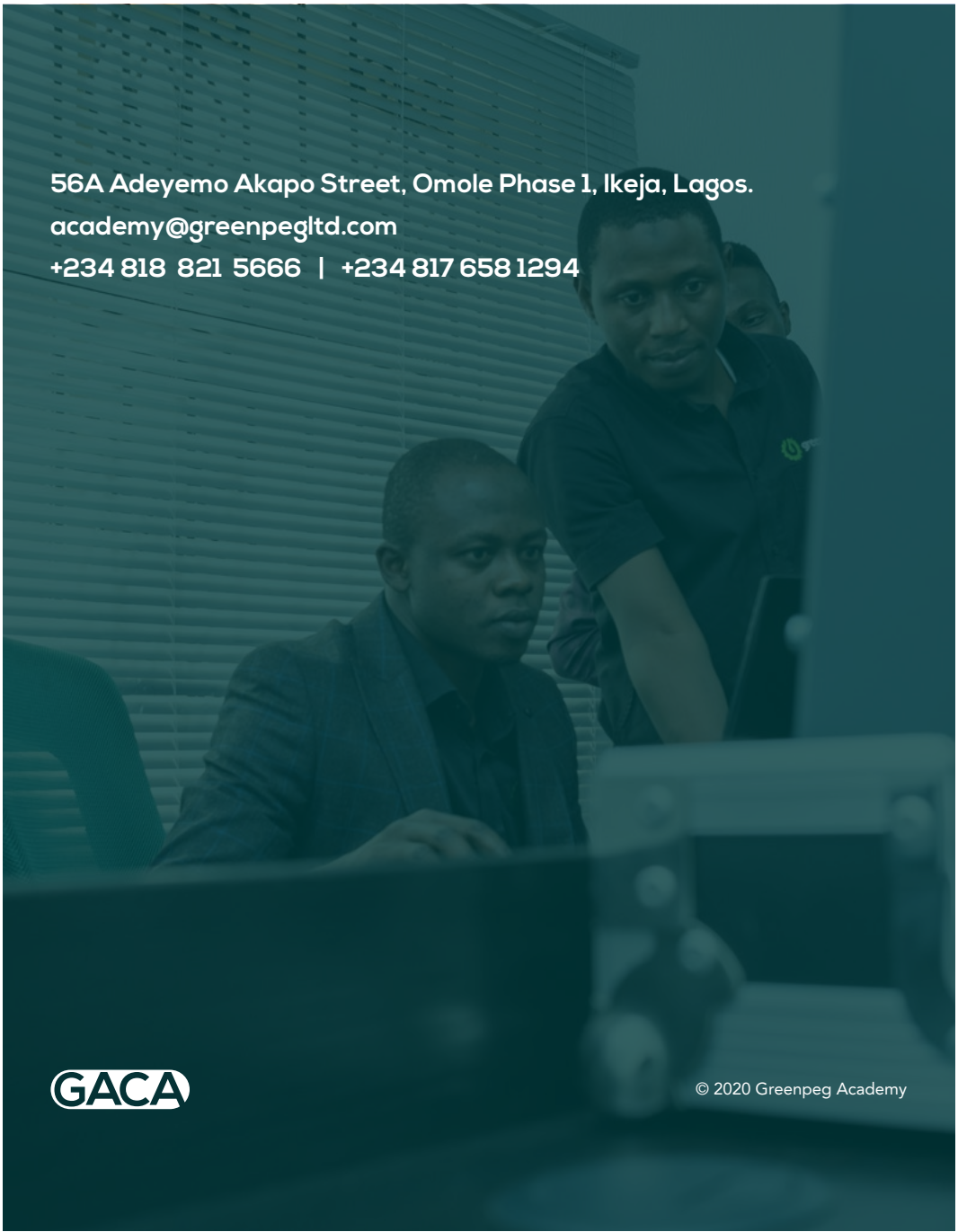
- » Python works and its place in the world of programming languages
- » To work with and manipulate strings
- » To perform math operations
- » To work with Python sequences
- » To collect user input and output results
- » Flow control processing
- » To write to, and read from, files
- » To write functions
- » To handle exceptions
- » To work with dates and times.

Duration:
5 days.

Accomodation / Hotel Reservations

Our training centres in Lagos are located near Hotels of repute that meets your lodging and relaxation, for our foreign and local (other States) participants. The list of hotels nearby will be provided upon registration confirmation.

For further correspondence on this please contact the training coordinator:
e-mail: academy@greenpegltd.com



56A Adeyemo Akapo Street, Omole Phase 1, Ikeja, Lagos.
academy@greenpegltd.com
+234 818 821 5666 | +234 817 658 1294

GACA