









ELECTRICAL HV/HM POWER SYSTEMS

DESIGN, PROTECTION, COORDINATION & DER

Improving & Protecting your Utility, Industrial - Renewable Power System for Enhanced Safety, Reliability and Efficiency.

-  25 Hours Live Interactive Sessions
-  Pre-course Preparation
-  Classroom Assessment
-  Videos & Exercises
-  Comprehensive Learning Kit
-  Continuous Learning Validation Certificate

22 – 26 April 2024

09:00 - 14:00 Atlantic Standard Time (AST)
15:00 - 20:00 Central Africa Time (CAT)

www.biiworld.com



Power Systems Analysis is an essential part of electrical power systems design. Load flow analysis, short circuit analysis, protection and coordination are necessary to verify that the electrical system including the system components, is correctly specified to perform as intended, withstand expected stress, and be protected against failures.

Power systems protection of various electrical equipment and apparatus requires a good understanding of phase and ground short circuit currents, detection, and safe clearing of the faulted equipment. Good design & coordination of electric powers and their protection equipment are vital for safety, maintenance, troubleshooting, and efficient operation of electrical systems and modern industrial plants.

This 5 day online masterclass on “Power System Design, Protection & Coordination” refresh and addresses many aspects of industrial & utility power systems, including system planning, equipment selection, specification and application, system grounding, protection and conformity with electrical code requirements etc.

Learning Objectives



1. **Improve** and refresh your knowledge of power system design, planning, analysis, protective device applications & relay schemes for safe and efficient operation of electrical power systems and equipment
2. **Minimize** adverse impacts of power trips through effective protection grading & coordination
3. **Develop** your own relay settings and thoroughly understand the philosophy of protective systems for substations, transformers, switchgear/circuit breakers, feeders, motors, generators, etc.
4. **Gain** valuable insights through actual cases illustrating various techniques in present use and highlighting approaches used by experienced system designers
5. **Troubleshoot** power system protection problems commonly faced by the industry and adopt recommended solutions that have proven successful
6. **Understand** how to apply microprocessor-based multi-function relays for the protection of various power system equipment and apparatus
7. **Discuss** the challenges on power system design and protection posed by renewable energy sources, independent power producers, micro-grids & smart grids





Benefits of Attending

Gain a solid understanding of power system fundamentals, design, and short circuit calculations which affect protection scheme requirements and its applications; as well as crucial knowledge to implement an effective modern electrical preventive and predictive maintenance techniques on both new and aging assets. Protection requirements for utilities, industrial plants, cogeneration, and interconnection with utility power systems are also explained in detail, together with important functional specifics such as testing and coordination of protection systems. The training will be presented with a practical approach in mind, with relevant case studies & industry best practices. Delegates are strongly encouraged to participate and contribute their cases for discussion. Participants can look forward to applying the knowledge gained in the workshop immediately back at their organizations to solve problems, improve their Power Systems and Maintenance Processes.



Who Should Attend?

Industries

- Oil and Gas
- Chemicals
- Mining
- Manufacturing
- Power & Utilities
- Transportation
- Food and Beverages
- Rail
- Pharmaceutica
- Semiconductors

Professionals involved in designing, selecting, sizing, specifying, installing, testing, operating and maintaining power systems:

Department

- Power Protection Engineering Teams
- System Design/Integration
- General Maintenance Professionals
- Electrical Maintenance Leaders
- Engineering Managers
- Automation
- Electrical & Instrumentation
- Instrumentation & Control
- Instrumentation & Design
- Power Plant Personnel

Department

- Utility Power Professionals
- Facilities
- Projects Engineers and Managers
- Technical Consultants/ Advisory Engineers
- Operations Leaders
- Field Engineering
- Supervisory Control & Data Acquisition (SCADA)
- Information/Control System





ERIC STARK PhD

ENG. TRAINER

Eric Stark has over 35 years of experience in the field of electrical power system design, protection, and control. Both utilities & industrial clients including oil and gas, silver, gold, and phosphate mining, co-generation, utility systems, pulp and paper, and many applications projects.

Eric has extensive experience in power system design, studies, and commissioning, with special emphasis on protection, power quality, power system grounding, power flow, short circuit, arc flash, transient stability, transient switching analysis, and harmonic studies.

He is the author of internal technical papers for major players like General Electric, Institute of Technology, Digital Energy, and has prepared and conducted numerous courses, workshops, and tutorials in academics and industry, globally, for GE, IEEE, and many more. Consulting & training experience and practice in industrial applications, utilities and academics in North America and around the world, including Asia-Pacific, the Middle East, and Africa.

Companies that have benefited from Eric's expertise include:

- Shell
- ABB
- Schneider Electric
- Chevron
- Eskom
- IEEE
- Nestle
- General Electric
- Honeywell
- Israel Electric Corp

and more.



Training Methodology

1. Pre-Course Preparation:
 - a. Pre-course questionnaire needs to be filled and submitted by the attendees before the online training. This will help the trainer to format the training as per attendees' understanding level and specific requirements.
 - b. Pre-course materials and assignments will be provided by the trainer before the online training.
2. Real Time Virtual Training: In the 5-day classroom, a immersive personalized approach will be given by the trainer.
3. Live Interactive Sessions: Polling, Q&A round will be provided to interact with the trainer online.
4. Videos & Exercises
5. Comprehensive Learning Kit: Trainer will provide course materials during/after the training which will be helpful for the attendees as the future reference in their continuous learning journey.
6. Break Down Day Timing:

Session	30 - 90 min
1 st Break	10 min
Session	30 - 90 min
Lunch Break	20 min
Session	30 - 90 min
3 rd Break	10 min
Session	30 - 90 min

Continuous Learning Validation Certificate:

- This certificate will validate and certify the attendees' credibility shown in continuous learning.
- The attendees will receive soft copy of this certificate only after attending all the 4 days training.



Day 1

1. Introduction to utility and industrial electrical power systems

- Power Systems grid fundamentals
- System design considerations
 - Safety
 - Reliability
 - Flexibility

2. System Planning

- Utility service & requirements
- Protection consideration
- Special Loads

3. Power System Configurations

- Equipment selection
 - Circuit Breakers
 - Buses
 - Voltage Transformers
 - Current Transformers
 - Relays & Protection Schemes
 - Microprocessor and Electro-mechanical

4. Power System Analysis Short circuit calculations

- Effects of Short Circuit
- Sources of Fault Currents
- Sensitivity & speed
- Voltage Considerations
- Database and system modeling
- Limiting short circuit currents



5. System Grounding Design Considerations

Principles of power system protection Ground fault protection

- System grounding methods
- Zero-Sequence currents
- Ground Fault concerns

Case Study: Sequence Component

6. Feeder Protection

- Fuse characteristics
- Time-current coordination curves
- Relay-fuse-relay TOC, IOC selectivity & coordination
- Main-Tie-Main transfer schemes
- Radial systems, Loop systems

Case Study: Calculation using the MVA method



7. Bus Protection

- Principles
- Topologies
- Protection Schemes
- Hi-ampacity current detection
- Hi-impedance relaying
- Bus-Feeder inter-relations

8. Renewable Energy Sources & IPPs

- IBR Inverter based resources
- IBR effects on industrial and utility networks
- Wind and solar power resources
- Protection Challenges posed by renewable energy sources, IPP & grid technology developments
- Power Stability issues & the associated impacts on Protection
- Microgrid technology developments
- Delegates will engage in discussion of the specific concerns that they are facing at their sites with the delegates' forum and the speaker.

9. Transformer Protection

- Substations components
- Protection philosophies
- Protection element
- Ground fault protection
- Neutral grounding systems



Day 4

10. Generator Protection

- Radial & Loop systems
- Multisource systems
- Protection main elements
- Phase and Ground Fault Protection
- Standby generation protection
- Backup protection relaying
- Volt per Hertz, Under/Over voltage & Frequency

11. Transmission Line Protection

- Radial, parallel & Loop systems
- Line protection
- Line differential communication

Day 5

12. Distance Protection Relaying

- Non-pilot schemes
- Pilot wire & schemes
- Distance protection schemes

13. Motor Protection

- Motor nameplates
- Thermal overload protection
- Thermal capacity relaying
- Acceleration limits
- Phase and Ground Fault Protection
- Protection elements
- Setting considerations

Exercise: A complete protection relay setting calculation



Does BII Online Virtual Training have the same value as traditional classroom training?

Yes, BII Online Virtual Training offers participants; same training system as in-person, i.e face-to-face engagement with instructors, course material, interactive participation of all delegates, and personal support that they would expect to find in a traditional classroom.

What are main features of your online courses? Are they on-demand? Is it different content from the in-person offering?

The content of the virtual training is similar to the in-person sessions and customized presentation makes it a richer online learning experience. As always, we will share presentation materials with attendees for later reference.

The online courses are not on-demand and recordings cannot be purchased. They are set on scheduled dates, live with an instructor and co-host via webinar software. While the day is shorter than an in-person session (4hrs vs 8hrs), timing are adjusted to accommodate attendees in different time zones and allow more time for one-on-one conversations via the Q & A.

What are the technical requirements for participation in a virtual course?

All you need to participate in virtual training are:

- Desktop or Laptop or Tablet Computer, and Internet connection
- Webcam
- Headset with built-in microphone

Can I attend an online training session if I have a Macintosh computer?

Yes, Our Online training systems does allow Macintosh computers, PCs, and computers running Linux to easily enter any of our online training sessions.

What type and version of browser will I need for online classes?

It is recommended that you use the latest version of Firefox, Chrome or Internet Explorer for Windows and Firefox or Safari for Mac. Each of these is available for free download and also suggested you have the PDF Reader

How do I have access to the trainer for questions?

As in the classroom, you will see the trainer in front of you and have the opportunity to ask questions at any time - all via audio and video transmission.

Is there a mute option within an online training session to minimize background noise from my audio connection?

Yes, the Mute button will display to the right of your name as you hover your mouse over your name shown in the Participants panel on the top, right side of the Web conferencing screen.

Do I get a Certificate at the end?

Yes, you will get a PDF version of your certificate of completion



High Voltage Electrical Maintenance

Facilitator : **John Robin**
Date : **11 - 14 March 2024**
Timings : **10:00 to 14:00 Atlantic Standard Time (AST)**
14:00 to 18:00 Greenwich Mean Time (GMT)



This 4 Day Online High Voltage Electrical Maintenance Course will provide attendees with a comprehensive understanding and the details covered in this course are covered in NFPA 70B, Maintenance Standards. Understanding how to create a safe work environment, and to maintain High Voltage Electrical Equipment will fulfil requirements set out in Occupational Health and Safety Standards.

John Robin - Our Expert Trainer is a Power Systems Electrician – Electrical Safety and Maintenance Instructor. For the past 25 years, have instructed more than 500 courses to a variety of industrial, commercial, and institutional companies across North America. Have extensive Electrical Safety and Maintenance experience (40 years) working in the Pulp and Paper industry - starting as an operator in pulp production for 10 years, and then apprenticing as an Electrician.

[CLICK HERE](#) To access this course agenda.

Energy Storage Systems

Facilitator : **Sean White**
Date : **27 - 30 May 2024**
Timings : **11:00 to 15:00 Atlantic Standard Time (EST)**
15:00 to 19:00 Greenwich Mean Time (GMT)



This 4 Day Online course will cover all the aspects of modernizing the grid from and energy storage point of view, from the individual household to the large utility scale infrastructure. It will cover the technical and business aspects of energy storage systems, including bidirectional electric vehicle technology and virtual power plants (VPPs).

Sean White - Our instructor is a world class expert in energy storage is an Award Winning IREC Certified PV Master Trainer. Our trainer was on the NABCEP PV Installer Exam Committee and helped author the NABCEP PV Installation Professional Task Analysis, which is the "gold standard" of PV certifications. Our instructor was also on the energy storage committee of the Solar ABCs PV Industry Stakeholder Group.

[CLICK HERE](#) To access this course agenda.

