COURSE OVERVIEW EE0579
Power Network Operations Advanced Knowledge

Course Title
Power Network Operations Advanced Knowledge

Course Date/Venue
December 09-13, 2024/MP1 Meeting Room, Khalidiya Palace Rayhaan by Rotana, Abu Dhabi, UAE

Course Reference
EE0579

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Power Network Operations Advanced Knowledge. It covers the components and architecture of power systems including generation, transmission and distribution; the factors affecting power system stability and the load flow analysis; the frequency and voltage control, congestion management, emergency control and system restoration following a blackout; and the high voltage transmission technologies, grid interconnections and power exchange and smart grid technologies.

Further, the course will also discuss the integration of renewable energy sources into the power grid; the role of energy storage in enhancing grid flexibility and supporting renewable integration; the advanced metering infrastructure (AMI), distribution system automation and distributed generation (DG) and microgrids; the asset management in distribution networks and advanced protection techniques; and the electric vehicle (EV) charging infrastructure, regulatory frameworks for power networks and electricity market mechanisms.

During this interactive course, participants will learn the role of tariff structures in influencing network operations and customer behavior; the cost-benefit analysis of network upgrades; the environmental considerations in network operations; exploring the impact of digital technologies on network efficiency, data management and cybersecurity; the artificial intelligence and machine learning applications; the blockchain in energy networks; and the trends in renewable energy technologies.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an advanced knowledge on power network operations
- Discuss the components and architecture of power systems including generation, transmission and distribution
- Examine the factors affecting power system stability and perform load flow analysis
- Carryout frequency and voltage control, congestion management, emergency control and system restoration following a blackout
- Recognize high voltage transmission technologies, grid interconnections and power exchange and smart grid technologies
- Integrate renewable energy sources into the power grid and examine the role of energy storage in enhancing grid flexibility and supporting renewable integration
- Identify advanced metering infrastructure (AMI), distribution system automation and distributed generation (DG) and microgrids
- Apply asset management in distribution networks and advanced protection techniques
- Discuss electric vehicle (EV) charging infrastructure, regulatory frameworks for power networks and electricity market mechanisms
- Identify the role of tariff structures in influencing network operations and customer behavior
- Carryout cost-benefit analysis of network upgrades and discuss the environmental considerations in network operations
- Explore the impact of digital technologies on network efficiency, data management and cybersecurity
- Identify artificial intelligence and machine learning applications including blockchain in energy networks and the latest trends in renewable energy technologies.

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of advanced power network operations for electrical engineers, power system operators, energy managers, grid planners, regulators and policy makers and other technical staff.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor(s)

This course will be conducted by the following instructor. However, we have the right to change the course instructor prior to the course date and inform participants accordingly:

Mr. Taiseer Ali, MSc, BSc, is a **Senior Electrical & Telecommunications Engineer** with over **30 years** of extensive experience **Power & Water Utilities** and Other **Energy Sectors.** His expertise includes **Artificial Intelligence Vs. Machine Learning** for Internal Auditor, Artificial Intelligence (**AI**) Strategy for Business Professionals, **Electrical Substation & Design**, **Electrical Engineering**, **Electric for Non-Electric**, **Electrical Faults** Analysis **Electrical Safety**, **Power System** Equipment, **Power System Protection and Relaying**, **Power Distribution**, **HV/LV Equipment**, **High Voltage Electrical Safety**, **LV & HV Electrical System**, **HV Equipments Inspection & Maintenance**, **HV Switchgear Operation & Maintenance**, **LV Distribution Switchgear & Equipment**, **Lock & Tag Out**, **Circuit Breakers & Switchgears**, Portable **Cables**, **Transformers**, Gas Insulated Substations (**GIS**), **HV Substation Inspection & Reporting**, **HV Cable Design**, **HV Electrical System Commissioning**, Fundamental of **Power System** Equipment, **HV Equipments Inspection & Maintenance**, Electrical Signal Analysis (**ESA**), **Electrical Equipment Circuits**, **Wiring & Testing**, **Electronic Circuits**, Electrostatic Discharge (**ESD**), **Metering Pump Selection**, Operation, Maintenance & Troubleshooting, **Ultrasonic Flowmetering** for Liquid Application, Li**quid & Gas Flowmetering & Meter Calibration**, **Water Meter Calibration**, PD **Meter Calibration** , Distributed Control System (**DCS**) Applications & Troubleshooting, **SCADA & Industrial Communication**, Process Logic Controller (**PLC**), **Load Flow** Calculation, **Cable** Installation, **Transformer** Maintenance, **Electrical** Safety, **Electrical** Drawing, **Power Generation & Transmission**, **Power Distribution & Network**, **Protection Relays**, **Electrical** Troubleshooting, **Earthing**, **Bonding**, **Lightning & Surge Protection**, **UPS & Battery**, **Instrumentation & Control**, **Process Control & Instrumentation**, **Industrial Communication**, **Flow** Measurement, **Level** Measurement, **Temperature & Vibration** Measurement, **Measurement** Instrumentation, **Pressure** Measurement, **Analytical** Instrumentation, **Calibration & Testing** Procedures, Final Control Elements, **Control Loops** Operation, **Control Panels**, **Power Generation**, **Power Transformers**, **Uninterruptible Power Systems** (**UPS**), **Battery Chargers**, **AC** & **DC Transmission**, **Distribution Network**, **Grid Input Assessment**, Load Flosw, Short Circuit, Smart Grid, Grounding, **Electrical Equipment**, **Electrical Motors** & **Drives**, Power System Harmonics, **Electrical Substation Design**, **Power Cable Testing & Fault Location**, **Circuit Breakers & Switchgears**, Electrical Distribution Design, Installation & Commissioning and **HVDC Transmission** & **Control**, Advanced Networking, Datron Maintenance, Cisco Internet, Data Base Access, Advanced Computer, AutoCAD, Standard Radio Devices, Advanced Calibration, Repair and Maintenance of VHF Portable Role, Combat Vehicle Reconnaissance 76mm and Target Engagement Using Simulaser.

During his career life, Mr. Taiseer has gained his expertise and thorough practical experience through handling challenging positions such as being the **Head of the Command Control & Communication Department**, **Head of the Academic and Technical Branch**, **Chief of the Frequency Branch**, **Commander**, **Electrical Engineer**, **Spectrum Management Engineer**, **Safety Engineer**, **Engineering Manager**, **Electrical Engineering Head**, **Quality Control Department Head**, **Engineering Supervisor** and **Lecturer/Instructor** for various companies and universities such as the Yarmouk University, C3 Directorate, JAF C3 Communication Workshops, Jordan Armed Forces Joint Officer and Military Communication College and multi-national companies and institutes.

Mr. Taiseer has a **Master's** degree in **Industrial Engineering/Engineering Management** and a **Bachelor's** degree in **Electrical/Communication Engineering**. Further, he is a **Certified Instructor/Trainer** and delivered various trainings internally in his previous companies.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1 ***Monday, 09th of December 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Power Systems:*** *Introduction to the Components & Architecture of Power Systems, including Generation, Transmission & Distribution*
0930 – 0945	*Break*
0945 – 1030	***Power System Stability:*** *Examining the Factors Affecting System Stability & Methods to Maintain Stability Under Different Operating Conditions*
1030 – 1130	***Load Flow Analysis:*** *Techniques for Performing Load Flow Studies to Determine the State of the Network for Efficient Operation*
1130 – 1215	***Frequency & Voltage Control:*** *Strategies for Managing Frequency & Voltage Levels within the Grid to Ensure Reliable Power Supply*
1215 – 1230	*Break*
1230 – 1330	***Congestion Management:*** *Understanding Congestion in Power Networks & Methods to Mitigate Congestion for Optimal Network Performance*
1330 – 1420	***Emergency Control Actions & Black Start:*** *Procedures for Emergency Control, including System Restoration Following a Blackout*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2	Tuesday, 10th of December 2024
0730 – 0830	***High Voltage Transmission Technologies**: Overview of High-Voltage AC & DC Transmission Systems & Their Applications*
0830 – 0930	***Grid Interconnections & Power Exchange:** Exploring the Benefits & Challenges of Grid Interconnections & Mechanisms for Power Exchange Between Regions*
0930 – 0945	*Break*
0945 – 1100	***Smart Grid Technologies:** Introduction to Smart Grid Technologies that Enhance Grid Efficiency, Reliability & Resilience*
1100 – 1215	***Renewable Energy Integration:** Strategies for Integrating Renewable Energy Sources into the Power Grid, Addressing Variability & Stability Issues*
1215 – 1230	*Break*
1230 – 1330	***Energy Storage Solutions:** Examining the Role of Energy Storage in Enhancing Grid Flexibility & Supporting Renewable Integration*
1330 – 1420	***Advanced Metering Infrastructure (AMI):** Impact of AMI on Network Operations, including Demand Response & Customer Engagement*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3	Wednesday, 11th of December 2024
0730 – 0830	***Distribution System Automation:** Technologies & Systems for Automating Distribution Networks to Improve Operational Efficiency & Reliability*
0830 – 0930	***Distributed Generation (DG) & Microgrids:** Challenges & Opportunities Presented by DG & Microgrids, Including Integration & Management*
0930 – 0945	*Break*
0945 – 1100	***Asset Management in Distribution Networks:** Best Practices for Managing Assets to Optimize Performance, Reduce Costs & Extend Asset Life*
1100 – 1215	***Advanced Protection Techniques:** Modern Protection Technologies & Schemes for Distribution Networks, Enhancing Reliability & Safety*
1215 – 1230	*Break*
1230 – 1330	***Electric Vehicle (EV) Charging Infrastructure:** Impact of EVs on the Distribution Network & Strategies for Managing Increased Dem&*
1330 – 1420	***Case Studies on Distribution Network Innovations:** Analysis of Real-World Examples Highlighting Innovative Solutions in Distribution Network Management*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4	Thursday, 12th of December 2024
0730 – 0830	***Regulatory Frameworks for Power Networks:** Overview of Regulatory Policies Affecting Network Operations & How Companies can Ensure Compliance*
0830 – 0930	***Electricity Market Mechanisms:** Understanding the Operation of Electricity Markets, including Wholesale, Retail & Ancillary Services*
0930 – 0945	*Break*
0945 – 1100	***Tariff Design & Impact on Operations:** The Role of Tariff Structures in Influencing Network Operations & Customer Behavior*
1100 – 1215	***Cost-Benefit Analysis of Network Upgrades:** Evaluating the Economic Implications of Network Upgrades & Expansion Projects*

1215 – 1230	*Break*
1230 – 1330	***Environmental Considerations in Network Operations:*** *Addressing the Environmental Impact of Network Operations, including Carbon Footprint & Sustainability Practices*
1330 – 1420	***Renewable Energy Certificates & Trading:*** *Mechanisms for Trading Renewable Energy Certificates to Promote Green Energy Adoption*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5 ***Friday, 13th of December 2024***

0730 – 0830	***Digitalization of Power Networks:*** *Exploring the Impact of Digital Technologies on Network Efficiency, Data Management & Cybersecurity*
0830 – 0930	***Artificial Intelligence & Machine Learning Applications:*** *AI & Machine Learning Applications in Network Operations for Predictive Maintenance, Anomaly Detection & Optimization*
0930 – 0945	*Break*
0945 – 1100	***Blockchain in Energy Networks:*** *Potential Applications of Blockchain Technology for Secure Energy Trading & Grid Management*
1100 – 1200	***Trends in Renewable Energy Technologies:*** *Latest Trends in Renewable Energy Technologies & Their Future Impact on Power Networks*
1200 – 1215	*Break*
1215 – 1300	***Workshop on Innovative Power Network Solutions:*** *Interactive Workshop where Participants Brainstorm & Develop Innovative Solutions to Address Current Challenges in Power Network Operations*
1300 - 1345	***Panel Discussion: The Future of Power Networks:*** *Expert Panel Discussion on the Future Challenges & Opportunities in Power Network Operations, including Policy, Technology & Customer Engagement*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators “GE Multilin Relay 469” and “GE Multilin Relay 750”.

GE Multilin Relay 469 Simulator

GE Multilin Relay 750 Simulator

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org