COURSE OVERVIEW EE0081-3D
Power System Planning & Economics

Course Title
Power System Planning & Economics

Course Date/Venue
September 15-17, 2020/Boardroom 3, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
EE0081-3D

Course Duration/Credits
Three days/1.8 CEUs/18 PDHs

Course Description

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

The conventional method of power system planning relies on the minimization of system costs subject to meeting given levels of demand and reliability, as well as other constraints.

This course covers power system planning, economics, operation and management issues as well as reliability in a deregulated environment. It will give a comprehensive overview of power system reliability.

Evaluation of generation, transmission and distribution system reliability and their impacts on system planning will be covered. The course will address the factors affecting power system expansion planning, operation and management as well as reliability in an electricity market including system adequacy, security, ancillary services market, decision making and other management issues.

The course is designed to develop an in-depth understanding of key economic and other concepts related to electric utility planning and to expose the participants to modern approaches of electricity planning, electricity pricing and environmental implications of alternative power development plans.

The goal for this course is to give the participants knowledge on how to use economic and reliability analysis as a tool for decision support during planning, design, operation and maintenance of electric power systems.

Course Objectives

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

- Apply and gain an in-depth knowledge on power system planning and economics
- Discuss the nature of planning in electricity sector and the hierarchy of electricity planning models
- Illustrate electricity demand forecasting and review the load forecasting techniques and guidelines for selection.
- Describe the economic operation of power system and employ the planning methods properly
- Explain the economics of power system reliability by identifying the key indicators, performing calculations and dealing with uncertainties in capacity expansion planning
- Employ the various electricity pricing approaches
- Determine the value-based transmission expansion by quantifying the value of transmission
- Formulate power-flow problem covering techniques for power-flow studies
- Perform newton-raphson solution method and other power-flow methods
- Recognize the optimal transmission capacity
- Carryout demand side management as an strategic option in utility planning
- Discuss the deregulation of electrical utilities including the various issues and approaches as well as the open electrical energy markets

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 power system planning and economics for all technical staff, engineers and managers from electric power utilities, independent generating companies including renewable sources, electricity regulators, system operators, industrial customers, manufacturing and consulting companies as well as educational and research institutions who deal with the planning and operation issues of modern power systems.

Course Fee

US$ 3,750 per Delegate + **5% VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Training Methodology

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Workshops & Work Presentations
20% Case Studies & Practical Exercises
30% Videos, Software & Simulators

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

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, Virginia 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 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 1-2013 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 Association 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 **1.8 CEUs** (Continuing Education Units) or **18 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.

Accommodation

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

Course Instructor(s)

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

Dr. Ahmed El-Sayed, PhD, MSc, BSc, is a **Senior Electrical & Instrumentation Engineer** with almost **35 years** of extensive experience within the **Oil**, **Gas**, **Power**, **Petroleum**, **Petrochemical** and **Utilities** industries. His experience widely covers in the areas of **Protection Relay Application**, **Maintenance & Testing**, **Information Confidentiality**, **Data Confidentiality** Classification, **IT Risk Management** Concepts, **NEC** (National Electrical Code), **NESC** (National Electrical Safety Code), **Electrical Safety**, **Electrical Hazards Assessment**, **Electrical Equipment**, **Personal Protective Equipment**, Lock-Out & Tag-Out (**LOTO**), Confined Workspaces, Alerting Techniques, Electrical Transient Analysis Program (**ETAP**), Power **Quality**, Power **Network**, Power **Distribution**, **Distribution Systems**, **Power Systems Control**, **Power Systems Security**, Power **Electronics**, Electrical **Substations**, **UPS** & **Battery System**, **Earthing & Grounding**, Power **Generation**, **Protective Systems**, **Electrical Generators**, **Power** & **Distribution Transformers**, **Electrical Motors**, **Switchgears**, **Transformers**, **AC** & **DC Drives**, **Variable Speed Drives** & **Generators**, **Generator Protection**, **GE Gas Turbines**, PLC, SCADA, DCS, Process Control, Control Systems & Data Communications, Instrumentation, Automation, Valve Tuning, SIS, SIL, ESD, Alarm Management Systems, Engine Management System, Bearing & Rotating Machine, Fieldbus Systems and Fiber Optics Technology. He is currently the **Systems Control Manager** of **Siemens** where he is in-charge of Security & Control of Power **Transmission Distribution** & **High Voltage** Systems and he further takes part in the Load Records Evaluation & Transmission Services Pricing.

During his career life, Dr. Ahmed has been actively involved in different Power System Activities including Roles in Power System Planning, Analysis, Engineering, **HV Substation** Design, Electrical Service Pricing, Evaluations & Tariffs, Project Management, Teaching and Consulting. His vast industrial experience was honed greatly when he joined many International and National Companies such as **Siemens**, **Electricity Authority** and **ACETO** industries as the **Instrumentation & Electrical Service Project Manager**, **Energy Management Engineer**, **Department Head**, **Assistant Professor**, **Project Coordinator**, **Project Assistant and Managing Board Member** where he focused more on dealing with Technology Transfer, System Integration Process and Improving Localization. He was further greatly involved in manufacturing some of **Power System** and **Control & Instrumentation Components** such as Series of Digital Protection **Relays**, MV **VFD**, **PLC** and **SCADA** System with intelligent features.

Dr. Ahmed is well-versed in different electrical and instrumentation fields like **ETAP**, Load Management Concepts, **PLC** Programming, Installation, Operation and Troubleshooting, **AC Drives** Theory, Application and Troubleshooting, Industrial Power Systems Analysis, AC & DC **Motors**, Electric Motor **Protection**, **DCS SCADA**, **Control** and Maintenance Techniques, Industrial Intelligent Control System, **Power Quality** Standards, Power Generators and Voltage Regulators, Circuit Breaker and Switchgear Application and Testing Techniques, **Transformer** and **Switchgear** Application, Grounding for Industrial and Commercial Assets, Power Quality and **Harmonics**, **Protective Relays** (O/C Protection, Line Differential, Bus Bar Protection and **Breaker Failure Relay**) and Project Management Basics (PMB).

Dr. Ahmed has **PhD**, **Master** & **Bachelor** degrees in **Electrical Engineering** from the **University of Wisconsin Madison**, **USA** and **Ain Shams University**, respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/ Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), an active member of IEEE and ISA as well as numerous technical and scientific papers published internationally in the areas of Power Quality, Superconductive Magnetic Energy Storage, SMES role in Power Systems, Power System **Blackout** Analysis, and Intelligent Load Shedding Techniques for preventing Power System Blackouts, HV **Substation Automation** and Power System Stability.

Course Program

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

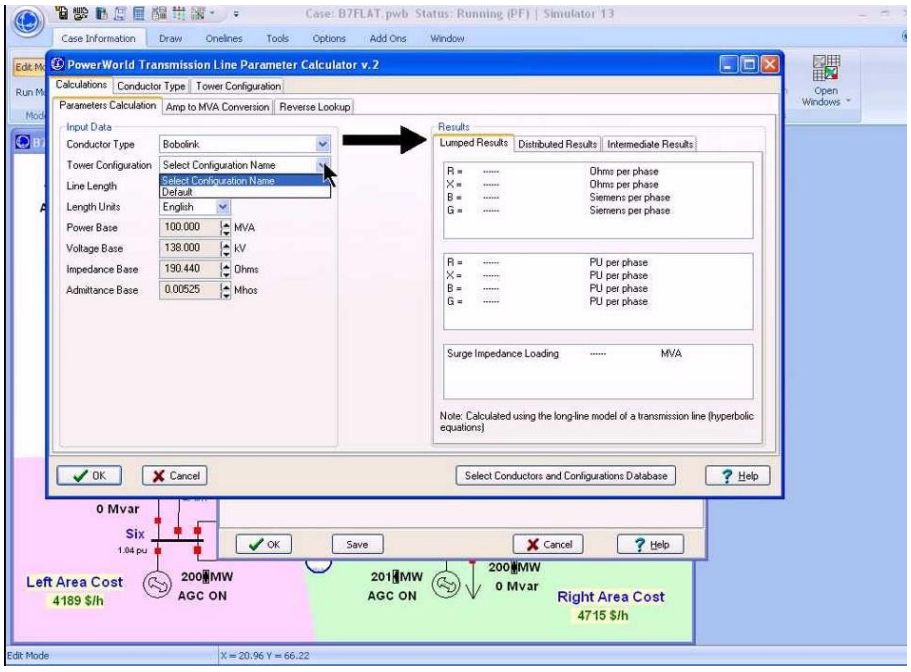
Day 1:	***Tuesday, 15th of September 2020***
0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Nature of Planning in Electricity Sector and the Hierarchy of Electricity Planning Models***
0930 – 0945	*Break*
0945 – 1100	***Electricity Demand Forecasting*** *Electric Power Transmission and Distribution Load Forecasting (How it is Done) ● Load Behavior and Load Growth Characteristics*
1100 – 1230	***Review of the Load Forecasting Techniques and Guidelines for Selection*** *Short Term Demand Forecasting Models ● Long Term Demand Forecasting Models ● Basic Theory and Mathematics of Modern Distribution Load Forecasting ● Load Curve End-User Modeling ● Examination of T&D Planning and Forecasting Needs*
1230 – 1245	*Break*
1245 - 1330	***Economic Operation of Power System*** *Economic Dispatch ● Unit Commitment ● Thermal Scheduling ● Conventional versus Decentralized Power System Operation*
1230 – 1420	***Planning Methods*** *Integrated Resource Planning ● Value Based Planning ● Planning Capacity ● Needs of Power Delivery*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2:	***Wednesday, 16th of September 2020***
0730 – 0815	***Economics of Power System Reliability*** *Key Indices of Power System Reliability and Their Calculations ● Linkage Between Reliability and Capacity Planning ● Dealing with Uncertainties in Capacity Expansion Planning*
0815 - 0900	***Electricity Pricing Approaches*** *What is the Difference Between a Megawatt-Hour and a Barrel of Oil ● Short-Run versus Long-Run Marginal Cost Pricing ● Theory of Peak Load Pricing ● Theory of Spot Pricing ● Locational Pricing: Concepts and Approaches ● Buyback Rates of Electricity Produced by Independent Producers ● Electricity Rate-Making in Practice ● Environmental Regulation and Electricity Pricing*
0900 – 0915	*Break*
0915 – 1100	***Value-Based Transmission Expansion*** *Quantifying the Value of Transmission*
1100 – 1230	***Power-Flow Problem Formulation*** *Techniques for Power-Flow Studies*
1230 – 1245	*Break*
1245 – 1420	***Newton–Raphson Solution Method*** *Other Power-Flow Methods*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

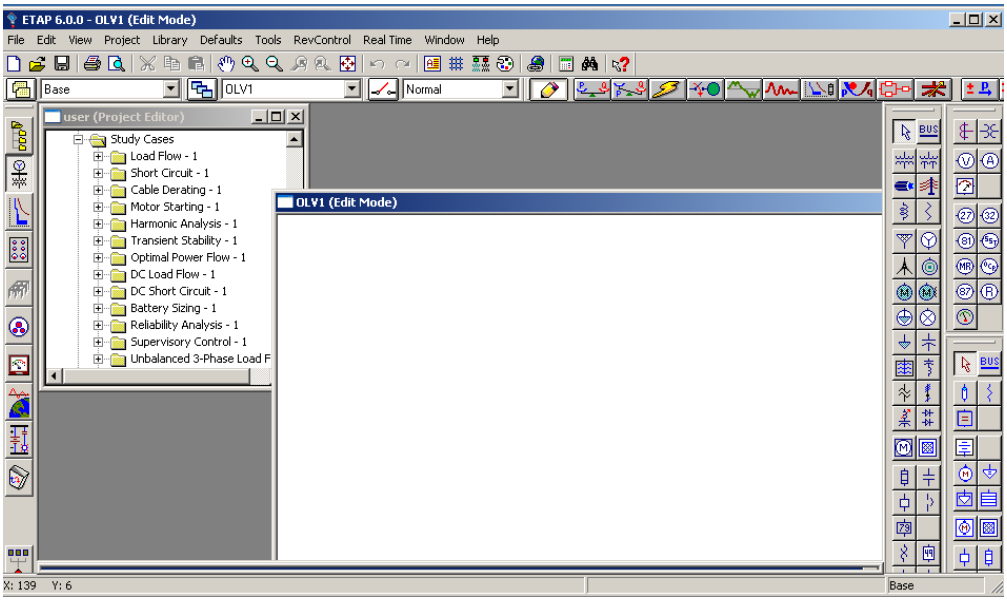
Day 3:	***Thursday, 17th of September 2020***
0730 – 0930	***Optimal Transmission Capacity***
0930 – 0945	*Break*
0945 – 1100	***Demand Side Management as an Strategic Option in Utility Planning***
1100 – 1215	***Deregulation of Electric Utilities: Issues and Approaches***
1215 – 1230	*Break*
1230 – 1345	***Open Electrical Energy Markets*** *Bilateral Trading ● Electricity Pools ● Comparison of Pool and Bilateral Trading*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulators (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 "Power World" and "ETAP software".



Power World Simulator



ETAP Software Simulator

Course Coordinator

Cristy Mamisay, Tel: +971 2 30 91 714, Fax: +971 2 30 91 716, Email: cristy@haward.org