



PES Educational and Professional Development Activities

by

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Overview

The power and energy industry is undergoing major shifts to meet the changing energy needs of the society with focus on efficiency, economy, reliability and impact on the natural environment. New sources of generation, such as wind turbine generators, are being added requiring special considerations regarding integration with the power grid, with due consideration to power quality and security of power supply. The present-day electric power systems are large, complex systems composed of thousands of devices with diverse characteristics requiring special considerations to ensure harmonious interplay. Secure, reliable and economic operation of such high order complex systems present enormous technical challenges.

In addition, the business structure of the industry has changed in recent years in most parts of the world: a shift from a “monopolistic” structure to market-based “competitive” structure. This has created a situation where regulators, legal and finance people are involved in making important decisions regarding the functioning of the power grid – decisions made all the more difficult by limited understanding of the physical and technical aspects of power systems.

All this has resulted in a situation where there is an enormous need for developing continuing education programs and reference documents for power engineering as well as non-power engineering professionals. The IEEE PES has stepped up to meet these extensive and growing education needs in a big way by organizing a broad range of tutorials, courses and technical activities addressing new problems and challenges related to the design and operation of today’s power systems. In addition, to address the future manpower requirements, PES has taken initiatives to promote and advance the professional development of power engineering students and organize forums for their interaction with industry experts.

The educational products and services provided by PES in recent years have grown significantly with a high level of participation from the diverse group that PES is serving. These are highlighted in the in the sections below.

Tutorials and Courses

Advanced Level Technical Courses/Tutorials for Practicing Power Engineers

These tutorials cover subjects of topical interest and emerging technical problems facing the electricity supply industry. They are usually offered at PES conferences (GM, T&D and PSCE)

by leading experts in specific technical areas. The Lifelong Learning Subcommittee of the Power & Energy Education Committee (PEEC) facilitates and supervises these tutorial offerings with the support of the various PES Technical Committees and Local Organizing Committees of conferences. Karen Butler of Texas A&M University is the current chair of PEEC, and Jason Stamp of Sandia National Labs is the current chair of the Lifelong Learning Subcommittee.

As an illustration of the subjects covered and number of tutorials organized, listed below are tutorials organized for the two PES conferences in 2010.

Tutorials organized at the T&D 2010 in New Orleans:

1. “*Gas Insulated Substations and Lines*”: full day tutorial, sponsored by Substations Committee
2. “*Breaker Failure*”: half day tutorial, sponsored by PSRC
3. “*Secondary Power Distribution Network*”: full day tutorial, sponsored by the T&D Committee
4. “*DNP3 Fundamentals*”: half day tutorial, sponsored by Communications Committee
5. “*DNP3 in the Real World*”: half day tutorial, sponsored by CC
6. “*Fundamentals of Wind Power*”: full day tutorial, sponsored by Wind Power Coordinating Committee
7. “*Smart Distribution Grid*”: full day tutorial, sponsored by Operations Committee
8. “*Static VAR Compensator*”: full day tutorial, sponsored by Substations Committee

Tutorials scheduled for GM 2010 in Minneapolis:

1. “*Transient Analysis of Power Systems: Solution Techniques, Tools and Applications*”: full day tutorial, sponsored by Substations Committee
2. “*Wind Plant Collector System Design*”: full day tutorial, sponsored by T&D Committee
3. “*Smart Distribution Systems*”: full day tutorial, sponsored by T&D Committee
4. “*Voltage Sourced Converters*”: full day tutorial, sponsored by Substation Committee
5. “*Synchronized Phasor Measurements*”: full day tutorial, sponsored by Power System Dynamic Performance Committee
6. “*Breaker Failure*”: half day tutorial, sponsored by PSRC

Online Courses under the IEEE Expert Now Program

PES was an early participant in IEEE’s cutting edge, online continuing education program: *IEEE Expert Now*. In its efforts to continually support its members’ professional development, PES recognized the value in making some of the educational materials online. PES has also actively supported its Chapters’ participation in the IEEE Expert Now Section-Chapter Program.

In developing these courses, we work very closely with Tara Gallus, Continuing Education and eLearning Program Manager at the IEEE Educational Activities Department. To coordinate

future PES activities in this area in an organized manner, a new subcommittee of PEEC on e-Learning was created last year. The subcommittee is chaired by Kankar Bhattacharya of Waterloo University.

To date, the following modules have been developed and released, with our support/sponsorship:

- *“Cyber Security of Substation Control and Diagnostic Systems”* by Joseph Weiss, technically sponsored by PES, released in June 2006.
- *“Power Quality”* by Mark Halpin, jointly sponsored by PES and IAS, released in March 2009. This was the 9th top accessed tutorial in 2009, among all the Expert Now modules produced by IEEE.
- *“Distributed Generation”* by Nikos Hatziargyriou and Stavros Papathanassiou, jointly sponsored by PES and IAS, released in September 2009.

The following modules are currently in development:

- *“Recent Trends in Substation Automation and Enterprise Data Management”* by John McDonald, jointly sponsored by PES and IAS, final edits being incorporated and expected to be released soon.
- *“Insulation Basics”* by Shesha Jayaram is being developed as a three-module series, covering all three types of insulation media: gas, liquid and solid, jointly sponsored by PES and IAS, expected to be released 3rd or 4th quarter of 2010.
- *“Introduction to Occupational Safety”* by Landis Floyd, jointly sponsored by PES and IAS, in early development, expected to be released in 3rd quarter of 2010.

In addition, the development of “Smart Grid” online tutorial series, with Saifur Rahman as the Series Editor, is underway. *“Distributed Generation”* and *“Recent Trends in Substation Automation and Enterprise Data Management”* are expected to be first in the series.

Plain Talk Courses for Non-Power Engineering Professionals

These courses are offered under the series collectively titled “Plain Talk about Electric Power System”, and are geared towards the utility board members and executives, power marketers, legislators, legal counsels, economists, accountants as well as engineers not in the power field.

The courses originally offered under the Plain Talk package included:

- *“Power System Basics-Understanding the Electric Utility Operation Inside and Out,”*
- *“Distribution System-Delivering Power to the Customer,”* and
- *“The Grid-The Interconnected Electric Bulk Power System.”*

The following four additional courses have been added to the package this year:

- *“Power Quality – from Lightning to Harmonics: Problems and Solutions,”*
- *“Operation of Electricity Markets-Technical and Economic Aspects,”*

- “*Smart Grid 101 –The Basics of Smart Grid,*”
- “*Smart Metering Lessons Learned-From Real World Installation and Operation,*” and
- “*Smart Grid Cybersecurity – Protecting the Smart Grid.*”

Susan Koval, Sr. Administrator Education at the PES Executive Office, is currently responsible for planning and organizing these courses. The goal is to have about 10 Plain Talk Events at different venues in 2010.

So far, courses have been scheduled at the following venues in 2010:

- New Orleans, T&D CE, April 19-22
- Minneapolis, PES GM’ 10, July 25-29
- Vancouver, BC at BC Hydro, September 15-17
- Columbus, OH at Team Fishel, October 26-28

Other locations under consideration for Plain Talk courses in 2010 include Georgia, Pennsylvania; and California.

Selection of Topics for Tutorials and Courses

PES has worked diligently in selecting appropriate topics for the tutorials/courses and the experts with the required level of expertise to present them. An industry wide survey was initially conducted to find the board range of topics of interest our members and other potential attendees. Annually, a meeting of the *Industry Advisory Group on Education* is held to review ongoing needs and discuss possible future activities. Representatives from the industry and IEEE EA staff are invited to this meeting.

Student Activities

PES is actively involved in promoting and advancing professional development of power engineering students. Some of the many approaches PES has adopted include significant support of the North American Power Symposium (NAPS), which is an annual student focused conference. In addition, students’ participation at PES conferences is encouraged by providing free hotel accommodation and organizing student poster sessions, Student/Faculty/Industry Luncheons and Job Fairs. Students are thus provided an opportunity to meet with industry experts and learn about currents trends and opportunities in the power industry as well as get valuable feedback on their research work.

These events are planned and organized by the Student Activities Subcommittee of PEEC. The subcommittee is currently chaired by Ganesh Venayagamoorthy of Missouri University of Science and Technology. The funding for supporting these activities is partially provided by Grainger Foundation and Industrial Partners, such as AREVA T&D.

The following is a brief summary of students' activities organized in 2010:

- At the T&D 2010, we supported approximately 100 students under the housing program with 3 nights of accommodation at a cost of about \$30K. A total of 120 students were enrolled in the student program, with the T&D organizing committee supporting the remaining 20 students.

A poster session was held on Tuesday, April 20 from 12:00 pm to 2:00 pm. About 110 poster submissions were received. The T&D organizing committee provided \$4,000 towards the poster contest. There were two categories of prizes awarded: graduate and undergraduate. For each category three prizes were awarded: 1st prize (\$1000), 2nd prize (\$600), and 3rd prize (\$400).

A Students Job Fair was organized on Wednesday, April 21 from 9:00 am to 11:00 am. This was followed by a Collegiate/Gold/Industry Luncheon from 11:30 to 1:30 pm.

- At the GM 2010 in Minneapolis, we expect to support the participation of about 200 students under the housing program (4 nights of accommodation) at an estimated total cost of about \$80K. Student poster session will be held on Monday, July 26 evening. Student/Faculty/Industry Luncheon is planned for Wednesday, July 28
- At NAPS 2010 in Arlington (Sept 26–28), we expect to support the participation of about 100 students with 3 nights of accommodation. There will also be a student paper contest.

IEEE EAB Society/Council Professional Development Award

In recognition of the outstanding contributions made in recent years in the education and manpower development areas, PES was selected as the recipient of the **2009 IEEE Educational Activities Board (EAB) Society/Council Professional Development Award**. The award was presented at the EAB Awards Presentation Ceremony in New Brunswick, NJ on 20 November 2009.