



جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

SHORT COURSE

MANAGING AND CONTROLLING REACTIVE POWER IN ELECTRIC GRIDS

February 28 — March 3, 2016





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Course Description

Reactive power (MVar) is an associate power component to real power (MW) in alternating current grids. It determines the behavior and performance of transmission voltages as a function of the real power transferred and delivered to the connected loads. Inadequate reactive power support may lead to lower voltages, which may result in voltage instability and voltage collapse. Managing and controlling reactive power, both capacitive and inductive, results in not only increased transmission capacity and power transfer capability of transmission corridors, but also improved quality and reliability of power delivery.

The primary objective of this course is to present a thorough analysis of reactive power, sources of reactive power internally and externally, function of reactive power, impact of inadequate reactive power support, and reactive power management in the electric grid.

Course Format:

Prepared course materials will be presented in a sequential flow. Lectures will provide guidelines and recommendations, wherever possible, so as to make the course a highly practical one. **In addition, live laboratory demonstrations will be carried out in our Energy Systems Laboratories at KFUPM.**

Course Topics

- Introduction, balancing of real and reactive powers in electric grids
- Physical and mathematical representations of reactive power
- The importance and role of reactive power; improving voltage profile and performance, increasing power transfer capability, and improving quality and reliability of power delivery
- Reactive power sources, internal and external sources, static and dynamic reactive power support
- Voltage instability and voltage collapse phenomena
- Managing reactive power, real-life application examples; relieving transmission bottlenecks, increasing power transfer capability, and supporting grid integrity
- Tools for studying and managing reactive power
- Reactive power function in High Voltage Direct Current (HVDC) transmission interconnections
- Reactive power control in the presence of renewable energy resources
- Managing and controlling reactive power in distribution networks
- **Tutorial examples and laboratory demonstrations for the management of reactive power**

Who Should Attend?

This course should be of great interest and benefit to all electrical engineers and staff members who are engaged in design, planning, generation, transmission, distribution, operation, protection, maintenance, and power quality in power utilities.

Course Dates	February 28 — March 3, 2016 19-23 Jumada I 1437 H
Duration	5 Days
Language	English
Fees	8,000 SR (Before February 1 st) 8,500 SR (After February 1 st)
Location	Dhahran, Saudi Arabia

Instructors

- **Dr. Abdel-Aty Edris, IEEE Fellow**



Dr. Edris is respected worldwide as a world-class expert in Flexible AC Transmission Systems (FACTS) technology and power electronics controllers. Dr. Edris is well-versed in project management, having managed the design, development and installation of the world's first FACTS installations. He is also widely known for his significant expertise in reactive power compensation, high voltage DC transmission, dynamic thermal circuit rating (DTCR) technology, power electronics, renewable energy resources, and smart grid technologies. In recent years he has added energy storage to his fields of expertise.

Dr. Edris has more than 35 years of industry and teaching experience, working at ABB, EPRI, Siemens Energy, and Quanta Technology, and teaching at universities in Egypt, Sweden, and the USA. He is currently an Adjunct Professor at Santa Clara University in California, USA. Dr. Edris has authored, coauthored or presented over 100 IEEE and CIGRE publications and holds numerous patents in the US and Sweden.

Dr. Edris's recent activities in Innovative Smart Grid Technology (ISGT) and integration of renewable energy resources include:

- Speaker at the ACI Energy Storage Conference, Nice, France, February 2013
- Session chair at the ISGT Conference, Washington, DC, January 2012
- Keynote speaker at the ISGT Conference, Saudi Arabia, December 2011

The other members of the instruction team include:

- **Prof. Ibrahim El-Amin, KFUPM.**
- **Prof. Mohamed Abido, KFUPM.**
- **Dr. Ali Al-Awami, KFUPM**

Contact Us

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