This 2-day training course with an optional half-day of training will take place on March 24-26, 2015 at the ABB Power Systems North America Headquarters in Raleigh, NC. This course will discuss the planning, modeling and economic considerations of High Voltage Direct Current (HVDC).

**Overview**
Participants will acquire an understanding of High Voltage Direct Current (HVDC) applications and related considerations including interaction with AC systems, modeling considerations, controls and economic project justification, (optional). A high-level understanding of HVDC technology, existing applications, market drivers and operational considerations will be discussed. Applications will consider both technical and economic drivers.

Completion of this course will allow attendees to be able to identify if HVDC may be appropriate for a given transmission system issue or development need. This course will also provide the background for attendees to appreciate and understand the issues brought about by a new or existing HVDC application that may influence the systems for which they are responsible.

**Who should attend**
Individuals who work for developers, electric utilities and transmission system operating companies who are involved in the planning, engineering, specification, and operation of power transmission systems.

**Note:** This course is held in English.

**CEU credit**
You will receive 1.6 CEUs for completing this course.

**Cost**
$1,850 USD for 2 full days (March 24 - March 25)
$400 for optional 1/2 day (March 26)
Course offerings
- HVDC transmission market drivers and benefits
- HVDC technologies including:
  - Technologies: Line Commutated Converter (LCC)
  - Technologies: Voltage Source Converter (VSC)
- HVDC configurations: Monopole, Bipole, Symmetrical monopole, and underground, submarine and hybrid
- HVDC design considerations including: harmonics and filters (LLC), reactive power and Short Circuit Ratio (SCR) considerations
- HVDC equipment including DC and AC equipment as well as HVDC cables and valves
- HVDC applications
  - Major projects in North America including: Quebec - New England, ATC Mackinac, Maritimes HVDC, IPP 2400 MW Upgrade, and Celilo Upgrade
  - Offshore projects including: DolWin1, DolWin2 and BorWin
  - Upgrades of Back-to-Back HVDC including: Blackwater Upgrade, Okaunaion Upgrade, Highgate Upgrade, Eel River Upgrade
  - HVDC controls and models for planning and specification studies
    - Conventional HVDC
    - VSC HVDC
    - High-level HVDC control functions including frequency controls, damping controls and runback controls
    - Control hierarchy
    - Prevention of Sub-synchronous Torsional Interaction (SSTI)
  - HVDC - AC system integration
    - Planning and specification studies including considerations, technology assessments, powerflow and rotor-angle stability, voltage stability, DC line design considerations and AC to DC line conversion
    - PSS/E examples including conventional HVDC and VSC HVDC
  - HVDC applications in weak systems
    - System issues including
      - Mitigation of low SCR conditions including special controls and Synchronous Condenser
      - AC voltage regulation,
      - Static Var Compensator (SVC)
      - STATCOM
    - Application examples
  - Future trends and challenges

Optional 1/2 day (Thursday, March 26)
- HVDC economic studies including Transmission quadratic losses and its loss penalty model
- Transmission constraints including transmission line limits, interface limits, contingency constraints, and nomograms
- Conditional constraints (voltage stability constraints) including screening rule for contingency constraints
- HVDC Grid Model
  - HVDC Grid Model (able to model mesh HVDC networks) including DC Bus, DC Line (usage losses), and AC/DC Converter (constant losses and usage losses)
  - HVDC Grid Model includes: optimize converter schedule to minimize the system production cost, DC line contingency analysis, and DC line and converter maintenance schedule
  - Applications to include: understanding HVDC grids flexible controls and operations as well as economic assessment for HVDC grids and HVDC systems

Recommended prior knowledge
Basic knowledge of electrical/power engineering and at least 5 years of professional experience in the power/energy industry.

Register now
To register, please go to: http://bit.ly/HVDCABB

For more information, please visit:
www.abb.com/power-systems-consulting