



## Power and Power Stations (Design, Installation and Maintenance) Training

### Description

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Modern Electric Power System has moved away from its regulated roots and is rushing headlong toward freewheeling competition, spurring more creative uses of energy and unprecedented advancements in plant efficiencies. Environmentalism has rushed forward too, ensuring that no power-generation technology is unscathed by demands for lower emissions and ecological impacts. Also over the past decade, computer capability has skyrocketed in effectiveness and plummeted in cost, launching a mass invasion of control rooms by digital instrumentation. Changes such as these make today's power plant a more diverse and more complex mix of technologies than ever before.

This course is designed to provide a good coverage of the generation, transformation, transmission, distribution and utilization of electric power and energy as well as the modeling, analysis, planning, design, monitoring and control of modern electric power systems. It will provide a contemporary overview of this far-reaching field as well as bringing together the core of knowledge from all of the many topics encompassed by the field. The course is intended to give participants a working knowledge of the modern electric power systems operations from generation through transmission and distribution through wiring. Basic electrical terminology and concepts are discussed with regard to design, construction, operations and maintenance of power plants substations and transmission and distribution lines. The effects of the deregulation of electric power utilities are discussed with interesting examples. The basic concepts of fiber optics and other telecommunications systems used in the electric power industry are also presented.

Further, the course will introduce and explore a number of engineering and economic problems involved in planning, operating, and controlling power generation and transmission systems in electric utilities. The topics included serve as an effective means to introduce participants to advanced operations methods applied to practical electric power engineering problems. Some topics cover methods that are currently being applied in the control and operation of the modern electric power systems. However, in a 5-day course it is, of course, impossible to consider all the problems and "best practices" in this advanced field. We can only introduce the types of problems that arise, illustrate theoretical and practical approaches and point the participant the direction of seeking more information

and developing advanced skills as they are required. As a matter of fact, this course covers a wide range of topics related to the design, operation and control of power systems that are usually treated separately.

Various issues are treated in depth with analytical rigor and practical insight. The subject matter is presented in a very interesting and unique perspective. It combines, in a structured way, control theory, characteristics and modeling of individual elements and analysis of different aspects of modern electric power systems.

## Course Outline

- Have an overview of the modern power system components and be able to explain their functions
- Know the concept of electric power generation including synchronous machinery, thermal generating plants and distributed utilities
- Learn the theory & principles of transformers and be able to identify its various types as well as their features & functions
- Understand transmission system structure, components & accessories and be able to determine sag & tension of conductor
- Identify the different types of substations and be able to gain knowledge on substation grounding, lightning & substation fire protection
- Know the distribution system modeling & analysis and learn power system operation & control
- Describe electric power utilization including the metering of electric power & energy and load characterization & load modeling
- Employ the process of power system analysis & simulation and be able to identify fault analysis in power systems
- Develop in-depth understanding on the principles of power system protection & power system transients including the protection of synchronous generators, digital relaying, lightning strokes, over voltages, switching surges & insulation coordination
- Learn power system dynamics & stability and be able to recognize the various stability methods used in modern power system
- Become familiar with power system planning & reliability applied in power systems
- Learn power electronics & power quality and be able to recognize their practical use in modern electric power system
- Understand economic dispatch of thermal units including its methods of solution
- Identify the factors affecting power system security and be able to determine the variables to be considered in the environmental controls of electric power systems