Overview

Modern power electronics devices and circuits are now in widespread use, across an ever-increasing number of power conversion and power control applications. The purpose of this course is to give a detailed introduction to the key aspects of power electronic converters and design.This course discusses the applications of power electronics for the smart gridfocusing on the flexible AC transmission system (FACTS) devices, HVDC transmission, series and shunt compensation, and phaseshifters. In this course, Custom Power Devices (CPD) for improving the power quality in the distribution grid will also be dicussed. This course will also discuss modeling and control of such devices.

The course also gives an overview of the electrical power system and power systems analysis, in the context of power electronics applications and their interaction with the power network. This course will provide a strong foundation in power electronics for systems engineers and project engineers, including a strong laboratory component. In this unit, students develop an in-depth understanding of the theory and applications in power systems of High Voltage Direct Current (HVDC) transmission and Flexible AC Transmission Systems (FACTS) devicesand Custom Power Devices (CPD).

Modules

A: Power Electronic Converters
B: HVDC transmission, FACTS Controllers and Electronically-Coupled Resources
C: VSC-HVDC and LCC-HVDC
D: AC and DC Microgrids

Dates: **19-23 February,2018.**
Venue: **IIT Bhubaneswar**
Deadline for registration: **5th February 2018.**
Limited number of seats are available for the course.

Tentative Lecture Schedule

Day1: Introduction (power system analysis methods/tools, steady-state power flow analysis, dynamic analysis, small-signal dynamics, ransient stability, electromagnetic transients)
Power Electronic Converters (Operational Concepts, Configurations, Control principals)

Day 2: HVDC transmission, FACTS Controllers and Electronically- Coupled Resources VSC-HVDC (VSC configurations, operational concepts)
Brief review of various power quality (PQ) problems and Custom Power Devices
Tutorial (2 hrs): Problem solving session with MATLAB and PSCAD

Day 3: VSC-HVDC and LCC-HVDC (harmonics & filters, coordinate transformation, instantaneous real/ reactive power, controls, phase-locked loop system, MMC Configurations and their applications in VSC-HVDC, principles of operation, controls)
Study of various active power filters viz., static shunt compensators (STATCOM), dynamic voltage restorer (DVR), unified power quality conditioner (UPQC)
Tutorial (2 hrs): Simulation study of HVDC, FACTS and CPD

Day 4: Emerging Applications of HVDC (grid integration of off-shore wind power plants, HVDC grid, large AC system segmentation)
Design of active power filters, various topologies and control schemes
Tutorial (2 hrs): Simulation study of HVDC, FACTS and CPD

Day 5: AC and DC Microgrids (Control, Operational Concepts) Solar of Wind Power Generation Units (Principles of operation, Control, Grid integrations issues/challenges, Solar power plants, Wind power plants)

You should attend if...

- you are an executive, engineer and/or researcher from manufacturing, service and government organizations including R&D laboratories working in energy apparatus for electrical power systems.
- you are a student (BTech/MSc/MTech/ PhD) or a faculty in academic institutions interested in learning how to design and integrate electronically coupled energy resources for microgrids

About the campus

Indian Institute of Technology (IIT) Bhubaneswar is a premier Institute of International importance, situated at the foot of Barunei Hill, a place of historical importance spreading over 936 Acres of land in the temple city of Bhubaneswar, Odisha. IIT Bhubaneswar has very vibrant academic and research culture by offering undergraduate, postgraduate and Doctoral programmes in various stream of engineering and sciences.

The Faculty

Dr.REZA IRAVANI *is a professor in University of Toronto, Canada. His is the founding director of the Centre for Applied Power Electronics (CAPE) in the University of Toronto. His research interests include control and operation of High Voltage DC (HVDC) grids, integration of renewable/alternative energy resources and smart grid technologies/concepts in distribution systems and HVDC-AC transmission systems, and microgrids. He is a fellow of the IEEE and the Editor-in-Chief of the IEEE Transactions on Power Delivery. He is also the chair of the IEEE Power Engineering Society on T&D Subcommittee on General Systems. Professor Iravani is one of the pioneers in the development of the control and the operational concepts of microgrids and active distribution systems.*

Dr.SRINIVAS BHASKAR KARANKI *is an assistant professor of Indian Institute of Technology Bhubaneswar. His research interests are in power quality, energy storage integration to grid, DC-DC converters for renewable energy sources, and power electronics applications in power systems. He has received POSOCO Power System Award (PPSA 2013) for the best PhD Thesis by power system Operation Corporation and foundation for innovation and technology transfer, New Delhi, India.*

Dr.D.GHOSH *is an assistant professor of Indian Institute of Technology Bhubaneswar. Her research interests include sensors design, array signal processing, theoretical and computational electromagnetics and optimization and numerical methods. She is a senior member of IEEE and a fellow of IETE.*

Fees and Registration

The participation fees for taking the course is as follows:

Participants from abroad : US $200
Industry/ Research Organizations: Rs 10000
Academic Institutions (faculty) : Rs 4000
Academic Institutions (students) : Rs 1500

The above fee includes all instructional materials, computer use for tutorials and internet facility at the host institute during the course. The participants will have to make their own arrangements for their travel, accommodation and food.However, accommodation can be arranged for a few participants on first-cum-first-serve basis against payment. For any queries regarding registration or other practical information, please contact the course coordinator.

Participants can register for the course on the link below

http://www.gian.iitkgp.ac.in/GREGN

Application Procedure

A one time fee of Rs 500/- (excluding the registration fee as mentioned above) may required to be paid while registering in the above GIAN web portal. Participants should further submit the Registration Fee (as mentioned above) as Demand Draft in favor of "CEP IIT Bhubaneswar" latest by 5 February, 2018 to the course coordinators.

Course Coordinators

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IIT Bhubaneswar

Integration of Electronically-Coupled Energy Resources and Apparatus in Electrical Power Systems

Course as approved under the MHRD Scheme on

Global Initiative on Academic Network (GIAN)

19-23 February,2018.

School of Electrical Sciences

IIT Bhubaneswar
Arugul campus
Bhubaneswar-752 050,Odisha,India.