

POWER CONVERTERS FOR ALTERNATE ENERGY SOURCES

Overview

With the growing energy demand worldwide, fast depletion of fossil fuels, climate change and global warming, there is a serious need to use renewable and environment friendly alternate energy sources. There are quite a few clean and renewable energy sources like biomass, wind, ocean, tide and solar energy. The power produced by these renewable energy sources can be used to supply isolated loads or can be fed to the utility grid. In either case, power electronic converters are generally used to convert the generated energy to a suitable form for utilization.

The output of many renewable generators like photovoltaic cells, fuel cells, etc. is variable dc, which requires a dc/ac conversion stage for grid connection. For other renewable generators with variable ac output, like wind or sea-wave generators, one can at first convert the variable ac to dc and then go for dc-ac conversion to connect to the utility line or use a direct ac-ac conversion. Therefore different types of power converters with a wide range of power rating are used. These power electronic converters help to utilize the energy in a more efficient way. The converters used for interfacing renewable sources to grid are supposed to perform complicated tasks like grid synchronization while maintaining the safety requirements and standards of the utility grid.

Objective of this short course is to familiarize the attendees with the power converters for use in such energy systems. This course is planned to be offered for two credits (optional) and the course duration is 10 working days. In the first part of the course, basics of energy systems including utility interface will be discussed that will be in the form of block diagrams and hard switched converters. Now a days, soft switching techniques has gained popularity due to improvements in efficiency with reduced size, weight and EMI. These improvements are essential in alternate energy power converters for effective use of alternate energy sources.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

Rules	<p>A: Power converters for alternate energy systems: utility interface schemes and other applications: <u>March 21 - March 26</u></p> <p>B: Application of soft-switched power converters in alternate energy system : <u>March 28 - April 01</u></p> <p style="text-align: center;"><u>Number of participants for the course will be limited to fifty.</u></p>
You Should Attend If...	<ul style="list-style-type: none"> ▪ You are an engineer and researcher from manufacturing, service and government organizations including R&D laboratories interested in designing converters for alternate energy sources. ▪ You are a student or faculty/staff member from an academic institution interested in learning how to do research on renewable energy or want to work with power converter for it.
Fees	<p>The participation fees for taking the course is as follows:</p> <ul style="list-style-type: none"> • Participants from abroad : US \$500 • Industry/ Research Organizations : INR 10000 • Academic Institutions : INR 2000 (students), INR 5000 (others) (For SC/ST students 50% fee is waived) <ul style="list-style-type: none"> ✓ The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility. ✓ The participants will be provided with accommodation and food on payment basis.

The Faculty



Prof. Ashoka Krishna Sarpangal Bhat (abhat@enr.uvic.ca) is a recipient of prestigious "Teaching award" among the faculty of Engineering, University of Victoria, Canada for "Excellence in teaching in the Faculty of Engineering" in 2008. For his outstanding contribution in "an innovative, distinctive, and exceptional way, to the instruction of undergraduate laboratory courses in Engineering at a Canadian University", he is sole

recipient of **Wighton Fellowship** (only one award per year in Canada) in 2010. He is now working as a professor in the department of Electrical and Computer Engineering. His research interest includes Power electronic controls, High-frequency link power conversion-resonant and pulse with modulation, Power converters for alternative energy sources, Design of electronic circuits for power control.



Dr. Sreeraj E S is working as an Assistant Professor in the Department of Electrical and Electronics Engineering, National Institute of Technology Goa, India. His research interests are Power electronics, Renewable energy systems.



Dr. Barry Venugopal Reddy is working as an Assistant Professor in the Department of Electrical and Electronics Engineering, National Institute of Technology Goa, India. His research interests are Multi-level inverters, Multi-level PWM Switching Strategies, Multi-level inversion realized through Open-end winding Induction motor drives, Renewable energy systems.



Dr. Suresh Mikkili is working as an Assistant Professor in the Department of Electrical and Electronics Engineering, National Institute of Technology Goa, India. His research interests include Power Electronics Applications to Power Systems, Power Quality Issues and Soft computing Techniques.



Dr. C Vyjayanthi is working as an Assistant Professor in the Department of Electrical and Electronics Engineering, National Institute of Technology Goa, India. Her research interests include Restructured Power systems, Reactive Power Management, Voltage Stability Assessment, Electric Arc furnace Operations, Flexible Alternating Current Transmission Systems, Smart Electric Grid Technologies.



Dr. Amol Rahulkar is working as an Assistant Professor in the Department of Electrical and Electronics Engineering at NIT Goa, Goa. His research interest includes Digital Signal Processing, Image Processing, Design of Wavelets and Filter-banks, and Application of Signal Processing and Wavelets in power systems and power electronics.



Dr. Soumitra Das is working as an Assistant Professor in the Department of Electrical and Electronics Engineering at NIT Goa, India. His research interest includes Power Electronics, Multilevel Converter, Pulse width Modulation, Switched Reluctance Motor and Drives, Renewable Energy Sources.

Course Coordinator:

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For complete registration for the course, visit:

http://www.nitgoa.ac.in/uploaded_files/GIAN_EEE.pdf