

Challenges and Opportunities in Renewable Energy: Role of the Smart Grid

Overview of the course:

The advent of the smart grid has brought about many challenges and opportunities that allow the operation of the traditional electric power systems to be more secure, reliable and efficient. The smart grid is a vision that makes possible, at the transmission and distribution levels, the integration of various distributed energy sources, smart sensors and frequency monitoring devices, intelligent substation and distribution equipment, as well as, at the customer level, the use of smart appliances at home. Recently, demand response has gained tremendous attention as it can potentially benefit power systems by relieving the system stress conditions and possibly deferring or avoiding construction of large-scale power generation and transmission infrastructures.

Modules	This course consists of two modules. June 3–June 8, 2016 Number of participants for the course will be limited to fifty.
You Should Attend If You are	<ul style="list-style-type: none">▪ Student of B. Tech, M. Tech, Ph. D. scholars and faculty from reputed academic institutions and technical institutions.▪ Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
Fees	The participation fees for taking the course (both modules) is as follows: Participants from abroad : US \$200 Industry/ Research Organizations: Rs. 5000 Academic Institutions: Rs. 2000 Research Scholars/students: Rs. 1000 (Rs. 500 for SC/ST students) The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility.

The Faculty



Professor Saifur Rahman is the founding director of the Advanced Research Institute (www.ari.vt.edu) at Virginia Tech where he is the Joseph R. Loring Professor of Electrical and Computer Engineering. He also directs the Center for Energy and the Global Environment (www.ceage.vt.edu). He is a Fellow of the IEEE and an IEEE Millennium Medal winner. He is the President-elect of the IEEE Power and Energy Society (PES)

for 2016 and 2017. He will serve as the President of PES in 2018 and 2019. He was the vice president for publications of IEEE and a member of the governing board in 2006. He is a member of the governing board of the IEEE Society on the Social Implications of Technology (SSIT). He was the founding editor-in-chief of the IEEE Electrifications Magazine and the IEEE Transactions on Sustainable Energy. He served as the chair of the US National Science Foundation Advisory Committee for International Science and Engineering from 2010 to 2013. He is a member-at-large of the IEEE-USA Energy Policy Committee. He is a Distinguished Lecturer for the IEEE PES, and has lectured on smart grid, energy efficient buildings, renewable energy, demand response, distributed generation and critical infrastructure protection topics in over 30 countries on all six continents.

He received his Ph.D. in Electrical Engineering from Virginia Tech in 1978. His M.S. degree is from the Stony Brook University and has a B.Sc.EE degree from the Bangladesh University of Engineering & Technology. His industry and government experience includes work with the Tokyo Electric Power Company in Japan, the Brookhaven National Laboratory in New York, Duke Energy in North Carolina and consultancy for the World Bank, the United Nations, US Agency for the International Development and the Asian Development Bank.



Dr. M. Rizwan (M'14, SM' 15) received the Ph.D. degree in power engineering from Jamia Millia Islamia, New Delhi, India in 2011. He is presently associated with Delhi Technological University, Delhi, as Assistant Professor in the Department of Electrical Engineering. He has published/presented more than 55 research papers in reputed international and national journals and conference proceedings. Dr. Rizwan has

been awarded three research projects in the area of renewable energy systems. He was selected for UGC research award for the period of 2014-2016. Recently, Dr. Rizwan has been awarded for post-doctoral research funded by Govt. of India through Raman Fellowships for Post-Doctoral Research in USA for Indian scholars for the year 2015-16. Dr. Rizwan has successfully conducted AICTE/UGC funded three short term training programme during 2011-2014. He was the organizing secretary of IEEE India International Conference on Power Electronics (IICPE-2012). His area of interest includes power system engineering, renewable energy systems particularly solar photovoltaic and soft computing applications in power systems. He is Sr. Member IEEE, Life Member, ISTE, Life Member SSI and many other reputed societies. He is also associated with many journals including IEEE Transactions, International Journal of Electrical Power and Energy Systems, Renewable and Sustainable Energy Reviews, International Journal of Sustainable Energy in different capacities.

Course Coordinator

Dr. M. Rizwan

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For Registration:

<http://www.gian.iitkgp.ac.in/GREGN/index>

Challenges and Opportunities in Renewable Energy: Role of the Smart Grid

TENTATIVE SCHEDULE

Registration: 10:00 AM to 11:00 AM

Inauguration: 11:30 to 12:30 PM

Module 1

June 3 Friday

Lecture 1 : 2.00 PM to 3:00 PM

Renewable Energy Sources: An Introduction

Lecture 2: 3:00 PM to 4:00 PM

Design and Modelling of Solar Photovoltaic Systems

Tutorial 1. 4:00 to 6:00 PM

Simulations on Solar Photovoltaic Systems

June 4 Saturday

Lecture 3 : 10.00 AM to 11:00 AM

Wind Turbines, Wind Power Plants

Lecture 4: 11:30 AM to 12:30 PM

Energy Storage Systems for Renewable Energy Systems

Tutorial 2. 2:00 PM to 4:00 PM

Wind Power Plants and Energy Storage: Challenges

June 5 Sunday

Lecture 5 : 10.00 AM to 11:00 AM

Challenges and Opportunities in solar photovoltaic systems

Lecture 6: 11:30 AM to 12:30 PM

Challenges and Opportunities in wind energy systems

Tutorial 3. 2:00 PM to 4:00 PM

Simulation studies on wind energy systems

Module 2

June 6 Monday

Lecture 7 : 10.00 AM to 11:00 AM

Smart grid components, energy storage modelling

Lecture 8: 11:30 AM to 12:30 PM

Role of Smart Grid

Tutorial 4. 2:00 PM to 4:00 PM

Design and development of smartgrid

June 7 Tuesday

Lecture 9 : 10.00 AM to 11:00 AM

Demand Response Potential

Lecture 10: 11:30 AM to 12:30 PM

Home Energy Management System

Tutorial 5: 2:00 PM to 4:00 PM

Best Practices in Grid Integration of Solar Photovoltaic and Wind Power Plants

June 8 Wednesday

Lecture 11 : 9.00 AM to 10:00 AM

Smart Buildings and Infrastructure

Lecture 12: 10:00 AM to 11:00 PM

Smart Cities

Tutorial 6: 11:30 AM to 1:30 PM

Simulation Studies on Home Energy Management Systems

Examination/Evaluation: 2:30 PM to 4:30 PM

Valedictory Function: 5:30 PM to 6:00 PM