2023 PES Distiniguished Lecturer Listing

First Name	Last Name	Category	Region	Abstracts	Languages (Other than English)	Lecture 1	Lecture 2	Lecture 3	Tutorial	Webinar
Mohd Zainal	Abidin Ab Kadir	Academic	10			Achieving the Best Practices in Lightning Protection System	Evaluation of Lightning Performance of Transmission Line	Fundamental of Insulation Coordination Studies		
Ram	Adapa	Industry	6			Planning FACTS Devices	Dynamic Rating Technologies	HVDC and AC to DC Line Conversion		
Julio	Aguero	Industry/ Utility	5	x	Spanish	Integration of Distributed Energy Resources (DER) and Electric Transportation in Distribution Systems	Distribution Reliability and Resiliency Assessment and Improvement	Grid Modernization and Smart Distribution Systems		
Mazana	Armstrong	Industry/ Utility	7			Utility's experience with AC interference between pipelines and power lines	Minimum Approach Distances and their impact on live-line maintenance of overhead			
Babak	Badrzadeh	Industry/ Utility	10	x		Power system operation with high share of inverter-based resources	Electromagnetic transient simulation models for large-scale system impact studies in power systems having a high penetration of inverter-based resources		The role of system strength and inertia management in transitioning to higher share of inverter-connected generation	
Luiz	Barroso	Industry	9		Portages, Spanish	Efficient Practices for Electricity Auctions and Energy Procurement	Electricity Markets Economics and Deregulation in Fast-growing (emerging) Markets	Hydrothermal Scheduling and Coordination in Electricity Markets		
Tianshu	Bi	Academic	10	x	Chinese	Power System Protection Technology with High Proportion Power Electronic Devices	Synchronized Measurement Technology and Its Potential Applications			
Jessica	Bian	Government/ Policy	2	x		Finding a Balance: Regulation and Bulk Power System Performance	Regulatory Aspects of Implementing Advanced Technology		Grid Reliability and Its Vital Signs	
Edson	Bortoni	Academic	9	x	Portages	Renewable power generation and storage systems	Energy Demand forecast allied to energy efficiency measures	Electrical machines in a changing world	Sensors for the energy industry	
Sukumar	Brahma	Academic	3	x		Power System Protection in the Era of Smart Grid			Protection of Microgrids	
Babu	Chalamala	Government/ Industry	6			Advances in Battery Technologies for Electric Vehicles and Grid Storage	Emerging eT&D Grids: Energy Storage, Electrification, and the Increasing Role of Power Electronics	Si Photovoltaics: Materials and Manufacturing	Grid Energy Storage Technology and Applications	
Yousu	Chen	Academic	6		Chinese	Computational Challenges for Power System Operation	High Performance Computational Advancements in Power Systems	Improve Real-time Operation with Advanced Computing		
Antonio	Conejo	Academic	2		Spanish	Operational Equilibria of Electric and Natural Gas Systems with Limited Information Interchange	Rethinking restructured electricity market design: Lessons learned and future needs	An Efficient Tri-Level Optimization Model for Electric Grid Defense Planning		
Jorge	Daher	Industry/ Utility	9		Spanish	Diagnostic of High Voltage Insulation				
Salvador	Daza	Industry	9		Spanish	Modeling Analysis for Modern Electrical Systems	Power Systems Economic Operation	Reactive Power and Voltage Control on Electrical Networks		
Babak	Enayati	Industry/ Utility	1		Farsi	IEEE 1547 standard and DER interconnections				
Juan	Gomez	Academic	9		Spanish	Medium and Low Voltage Fuses	Overcurrent Protection (Transformer, Motor, Semi-conductors)	Power Quality		
George	Gross	Academic	4			Implementation of the V2G Concept (Battery Vehicles) into the Grid	Uncertainty and Risk Management in Electricity Markets	Restructuring of Electricity Industry		
Jinliang	He	Academic	10	x	Chinese	The Development of Gas-insulated Transmission Lines	Lightning Protection Technologies of Power Systems	The Development and Applications of Surge Arresters for Lightning Protection of transmission Lines		
Syed	Islam	Academic	10	x		Condition Monitoring of Wind Turbine Generators	A Journey on Frequency Response Analysis for Power Transformer Fault Detection- Offline to Online	Technological Advances in Grid Code Compliance, High Penetration and Drive Train Diagnostics of Wind Energy Conversion Systems		
Jose	Jardini	Academic	9		Portages, Spanish	HVDC Line Design	HVDC Vs. HVAC Economic Evaluation			
Dragan	Jovcic	Academic	8	x		DC Transmission Grids: Components, Modelling, Control and Protection Challenges	DC/DC converters for DC Transmission Grids			
Sukumar	Kamalasadan	Academic	3			Control and Management of Bulk Power Grid with Inverter Based Resources (IBRs)	Operating Modern Power System under Uncertainty	Can Modern Power System Achieve 100% Renewable Energy?		
Chongqing	Kang	Academic	10	x	Chinese	Smart meter big data analytics	Modeling and optimization of multiple energy systems	Integrating High Share of Variable Renewable Energy in Bulk Power Systems		
Mladen	Kezunovic	Academic	5			Automated Fault and Disturbance Analysis	Protective Relaying Design, Modeling and Simulation	Smart Grid		
Daniel	Kirschen	Academic	6			Can We Prevent Blackouts			Cyber Physical Systems Security for the Power Grid	
Shrikrishna	Kulkarni	Academic	10			Transformers Design Principles and Advanced FEM Analysis	Revisiting Electromagnetic Concepts Relevant to Power Equipment and Systems	Hysteresis Phenomena in Transformers and Rotating Machines: Physics and Modeling		
Emil	Levi	Academic	8	x		Integrated on-board battery chargers for electric vehicles	Multi-phase drive and generation systems	Multilevel multiphase drive systems: Topologies and PWM control		
Henry	Louie	Academic	6			Community Microgrid Applications in Developing Communities	Energy Poverty and the Role of the Power Engineer	The IEEE Power & Energy Society: Benefits, Organization, History and Town Hall Discussion		
Vahid	Madani	Industry/ Utility	6			Disaster Recovery architecture development, Energy System Resiliency, business case roadmap development				
Pierluigi	Mancarella	Academic	10			Multi-Energy Systems: An introduction to the Smart Grid beyond electricity	Power Systems Resilience: Concepts, Models and Assessment	Techno-economic modelling and optimization of smart buildings, smart districts, community-based energy systems, and microgrids		
Tapan	Manna	Industry	5			AC Substation Grounding Design	Field Acceptance Tests of Oil filled Transformers	HVDC Design Considerations – A Utility Perspective		
John	McDonald	Industry/ Manufacturing	3			Smart Grid	Substation Automation	SCADA Systems		
A. P. Sakis	Meliopoulos	Academic	3			Power System Grounding				
Bruno	Meyer	Industry/ Utility	8		French, Portugese	Demand Side Management and Flexibility in Tomorrow's Power Systems	Electricity Markets in France	Smart Grids		
Federico	Milano	Academic	8	x		A Continuum-based Approach to Frequency Estimation	Workshop: Stochastic Algebraic-Differential Equations for Power System Modelling and Dynamic Analysis			
Jovica	Milanovic	Academic	8			Economic Impact of Voltage Sags and Short Interruptions	Global Control of Sustainable Power Systems	Operation and Control Challenges in Future Sustainable Power		
Joydeep	Mitra	Academic	4	x		Energy Assurance with Renewable Generation	Tutorial: Grid Reliability: Evaluation, Applications and Emerging Issues	Use of Energy Storage for Reliability Improvement of Renewable Generation		
Nilesh	Modi	Industry/ Utility	10			New and emerging bulk power system security challenges	Large-scale Electromagnetic Transient model for assessing impacts of high penetration of inverter-based resources on power system security		Power system operation with a high share of inverter-based resources	
Ali	Moshref	Industry/ Utility	7	x	French, Persian	Power Quality and Harmonics	Power System Grounding and Bonding	Fundamentals of Power System Planning and Operation		
Mohamd	Moursi	Academic	8			Optimal Design and Operation of Hybrid Renewable Power Plant with Dispatching Capability			FlexGrid Platform: Flexible Power Grid Technologies Toward 100% Renewable Energy Integration	Control Strategies for Hybrid AC/DC Transmission Power Grids with Renewable Energy Integration
Ming	Ni	Industry/ Manufacturing	10	x	Chinese	Regional and Inter-regional Value-based Transmission Planning	Power System Security and Stability: Current Status and Development Trends	Smart Grid and Ubiquitous Power Internet of Things		
Damir	Novosel	Industry/ Utility	3			Improving the Power Grid Performance in the Complex Environment	Sustainable Energy Trends, Opportunities, and Challenges	Wide Area Monitoring Protection and Control – Transmission Smart Grid		
Luis	Ochoa	Academic	10	x	Spanish, Portuguese	Making our Distribution Smarter and Low Carbon: A Regulatory Perspective	New Approaches for the Control of Future Distribution Networks		Advanced Modelling of Smart Distribution Networks Using OpenDSS	Smart Grids: Concepts and Implementation in the European Context

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Mark	O'Malley	Academic	8			Harvesting Renewable Energy: The Grid Integration Challenge	Operation and Planning Power System with Ultra-high Wind Penetrations: Research Questions and Results	Wind Grid Integration Studies: Ireland a Case Study		
Eduardo	Ortiz	Academic	9		Spanish	Learnings of the Complete Power Grid: Destruction in Puerto Rico by Hurricane Maria	Cyber-Physical Systems (CPS) Applied to Nonlinear Modeling and Control of Photovoltaic Power Systems	Understanding the History of Fuel Cells (FC) from 1860 until 2010		
Bikash	Pal	Academic	8			Flexible AC Transmission System Modeling and Control	Robust Control In Power Systems			
David	Peelo	Consultant	7			Current Interruption in Atmospheric Air			Current Interruption Transients Calculation	Surge Arrester Application
Saifur	Rahman	Academic	2			Alternate Energy	Critical Infrastructure Protection	Mitigation of Greenhouse Gas Emissions		
Wanda	Reder	Industry/ Manufacturing	4			Application of Distribution Automation and Associated Benefits	Approaches and Lessons Learned for a Comprehensive Reliability Improvement Effort	Power Industry Workforce in Its Challenges		
Guillermo	Rodriguez	Industry	9	x	Spanish				Distribution Systems Introduction	Distribution Systems Planning
Hugh	Rudnick	Academic	9		Spanish	Distribution Benchmark Regulation and Pricing	Long Term Supply Contract Auctions- the South American Model	Transmission Expansion in Deregulated Environment		
Tapan Kumar	Saha	Academic	10	x		Renewable energy integration to the grids	Transformer ageing diagnosis & condition monitoring		Transformer ageing diagnosis & condition monitoring	
Kalyan	Sen	Industry/ Utility	2			FACTS Controllers and Their Modeling Techniques				
Mohamed	Shahidehpour	Academic	4			Power System Control Center	Power System Deregulation and Electricity Restructuring	Power System Operation		
Dean	Sharafi	Industry/ Utility	10			Operating Modern Power System under Uncertainty	Industry 4.0 and Energy Transition – How can the application of Big Data, analytics and advanced communication support the power industry			
Chanan	Singh	Academic	5	x		Reliability Evaluation of Smart Grid including the impact of Cyber-physical Interactions	Wind Farm Diversification to Smooth Intermittency and Improve Reliability			
Sri Nivas	Singh	Academic	10	x		Issues and Challenges for Wind Power Integration into Power Systems	Estimation of Grid Harmonics in the Presence of Renewable Energy Sources	Role of Forecasting in Power Systems		
Anurag	Srivastava	Academic	6			Energy Management and Control for Active Distribution Systems	Smart Grid Technology	Synchrophasor Technology and Applications		
Peter	Sutherland	Industry	1			Electrical Arc Flash Hazards - Is your company in compliance?	Grid codes and wind farm interconnections	Harmonics in Electrical Power Systems: Effects of New Technologies		
Enrique	Tejera	Industry	9	x	Spanish	Substation Maintenance				
Lina	Tjernberg	Academic	8			Asset Management with power system applications	Power system reliability assessment	Smart Grid: European and Swedish experience		
Ebrahim	Vaahedi	Consultant	4			Application of Optimization in Power System Operation	Power System Operation	Microgrid Technology Requirements		
Srinivas	Varadan	Industry/ Manufacturing	3	x		Asset Performance Management in Electric Utilities	Tutorial: Asset Investment Planning for Electric Utilities	Tutorial: Asset Investment Planning for Electric Utilities Using the power of Data Analytics in Electric Utilities		
Costas	Vournas	Academic	8		Greek	Power System Dynamics	Voltage Stability	Wind Power Integration		
Jianhui	Wang	Academic	4		Chinese	Advanced Power System Operations with Uncertain Wind Power	Distributed Direct Load Control for Large-scale Residential Demand Response			
Dennis	Woodford	Industry/ Utility	7			Conversion of AC Transmission to DC	VSC Transmission with Overhead Transmission	Wind Farms Operation in Weak System		
Jonathan	Woodworth	Consultant	3			Surge Protection of Power Systems for the Non-Technical Professional	The History of Surge Protection of Power Systems		Surge Protection of Power Systems	
Le	Xie	Academic	5			Toward carbon-neutral electricity and mobility: Is the grid infrastructure ready?	An Open-access Cross-domain Approach to Analyzing the Impact of Extreme Events on the Electricity Sector: What We Learned from COVID-19 and 2021 Texas Winter Outage		Streaming Analytics for the Future Grid	
Xiao	Zhang	Academic	8		Chinese	Congestion Management and Transfer Capability Enhancement using FACTS	Voltage Stability of Unbalanced Three Phase Power Systems	Wave Generation Technologies		

First Name	Last Name	Presentation Title	Presentation Type	Abstract	Presentation #2 Title	Presentation #2 Type	Abstract #2	Presentation #3 Title	Presentation #3 Type	Abstract #3
Babak	Badrzadeh	Electromagnetic transient simulation models for large-scale system impact studies in power systems having a high penetration of inverter-based resources	Webinar	Power system operators and network owners rely on power system modelling and simulation to maintain secure operation of power systems in real time. Conventional power system simulation models, typically referred to as root-mean square (RMS) models, have been used worldwide by all major network owners and system operators to assessing system security. As power system transition towards large amount of inverter-based resources, system security assessment tools that uses RMS model of the plants would not fully capture model dynamics associated with inverter-based resources and hence could compromise security assessment. This is largely because the fast-acting dynamics associated with inverter-based resources and are often cannot be represented in RMS models. On the other hand, electromagnetic transient (EMT) models, which are used by original equipment manufacturers (OEMs) for designing their equipment, captures these fast-changing dynamics which are particularly important for low system strength conditions. However, EMT models are complex and often need more computing resources then RMS models. Integrating number of EMT models which often needs specific solution time steps requires unique approach and higher computational requirements. This presentation will discuss fundamental differences between RMS and EMT models, appropriateness of models while assessing system security in a power system having a high penetration of inverter-based resources, practical experiences while benchmarking system events with RMS and EMT models, development of EMT-type models for large-scale power systems comprising several hundreds to thousands of busbars.	Power system operation with high share of inverter-based resources	Webinar	Many power systems across the world is seeing high penetration of inverter-based resource (IBR) at transmission and distribution level. Operating a power system with large share of inverter-based resources have unique challenges in terms of maintaining sufficient system strength, inertia and voltage control. During prior outages of network elements such as transmission lines and reactive support plant occurs from time to time. Increased uptake of IBR, often connected to less interconnected and meshed parts of the network, has made outage assessment significantly more complex requiring more detailed assessment than before. This is because in several circumstances a line outage would result in a substantial reduction in the level of system strength available to the IBR to the extent that stable response is no longer achieved. Correct power system operation with high share of IBR requires the use of fit for purpose and accurate and validated power system simulation models. Apart of developing fit for purpose model ongoing validation of power system simulation models will ensure the highest confidence in the accuracy of individual plant and overall system models, hence the conclusions gained from them. This presentation will discuss role of IBR in transiting toward sustainable and renewable power system which is also resilient. The presentation will use Australia an example and share Australian experience of operating a grid with high share of inverter-based resources including development and validation of fit for purpose models, use of it for developing operational constraints and key measures put in place to maintain system security and reliability of a power system with high share of IBR.	The role of system strength and inertia management in transitioning to higher share of inverter-connected generation	Webinar	System strength is the ability of the power system to maintain and control the voltage waveform at any given location in the power system, both during steady state operation and following a disturbance. It is an inherent characteristic of power system. System strength is important for the maintenance of normal power system operation, for the power systems dynamic response during a disturbance, as well as for returning the power system to stable operating conditions. System inertia is a key quantity for power system operation which helps to reduce rate of change of frequency following a disturbance. However, inertia by itself would not be able to arrest the frequency. Large amount of newly connected inverter-based resources would interface with the grid through power electronics. Therefore, they are electro-mechanically decoupled from the grid unlike synchronous machines. Therefore, these devices do not provide synchronous inertia to the grid. With the reduction online synchronous generators as result of substantial penetration of inverter-based resources, the amount of inertia available to power system reduces. This presentation will discuss key aspects of system strength and inertia, how they are distinct but interlinked to certain extent, impacts of not having sufficient system strength and inertia and minimum requirements for managing sufficient system strength and inertia while power system is transiting towards higher share of inverter-based generation.
Tianshu	Bi	Power System Protection Technology with High Proportion Power Electronic Devices	Webinar	High proportion power electronic devices are penetrating all the aspects of the power system, such as the power plant, power grid, and load. The fault characteristics of power system under high permeability power electronic devices have changed fundamentally due to the flexible control strategy and nonlinearity, which leads to serious problems such as performance degradation and even incorrect operation of conventional protection. The lecture will introduce the research status and development prospects of fault characteristics of power system with high proportion power electronic devices. The fault current calculation models and existing problems are analyzed. Moreover, the protection adaptability of three typical power systems (system with integration of large-scale renewable energies, DC network without fault clearance capability and DC/AC distribution network with fault clearance capability) are discussed. Finally, the possible future development trend of new protection principles is suggested.	Synchronized Measurement Technology and Its Potential Applications	Webinar	An advanced and comprehensive measurement system is the basis for revealing the nature of power systems, perceiving their states, and guaranteeing the grid security. With the increasing development of renewable generators and new types of loads, a large scale of power electronic devices has been commissioned into the power systems including generation sources, transmission lines, and loads. The nature, analysis methods, and operation modes have been changed dramatically, which challenges the synchronized phasor measurement technology. The lecture will introduce the basic concept of synchronized phasor technology and its developing history. The worldwide implementation of synchrophasor measurement technology and Chinese practice are investigated. On the basis of this, characteristics of power systems with large scale of power electronics, the synchronized measurement methods which are suitable for renewables, active loads, and power system closed-loop control are proposed, and the corresponding synchronized measurement devices are developed. The system integration technologies, including communication, data compression and storage are discussed. The potential applications of synchronized measurement technology are analyzed as well. This lecture can be extended to a tutorial with the following topics:			
Jessica	Bian	Finding a Balance: Regulation and Bulk Power System Performance	Webinar	What is driving our industry to improve performance? How do we, as an industry, make sure we are performing to our customers' expectations? In today's power systems, every technology employed, trend established, and policy or standard implemented, should be done so with the best interests of the customer in mind. The utility sector is economically immense and vast in geographic scope, and it combines ownership, management, and regulation in complex ways to achieve reliable energy service. This lecture provides a broad view on energy market regulation in the US, including a rulemaking process and landmark orders. It addition, it explores how improving bulk power system performance through technology, data, and policies will benefit the customers of electric power.	Grid Reliability and Its Vital Signs	Tutorial	Course Syllabus Part One: Bulk Power System Overview 1. Overview and introduction to course 2. System components 3. Reliable service Part Two: Reliability Indicators 1. Measure in operations 2. Measure in planning 3. Measure in cyber and physical Security 4. Composite indices Part Three: Data Sources 1. Real time information 2. Equipment outage rate 3. Disturbance report Part Four: Trending and Conclusion	Regulatory Aspects of Implementing Advanced Technology	Webinar	Would deploying energy storage and/or other innovative technology alter business models and the utility of the future? We are experiencing significant changes in energy supply due to a number of factors, including the increased availability of natural gas; the growth in renewable, demand-side and storage technologies; and new environmental requirements. This lecture provides an overview of US federal regulation of public utilities, including rate revision, challenge process, and the landmark orders that shaped energy industries we have today. In addition, the lecture offers insights of why energy industries moved from traditional cost-based regulation to competitive markets in an open access environment, and how regulators encourage the use of advanced technology in new transmission projects. Advanced transmission technologies1 increase the capacity, efficiency, or reliability of an existing or new transmission facility while continuing to ensure that consumers have access to sustainable energy at a reasonable cost. Current regulations establish incentive/performance-based rates for the transmission of electric energy in interstate commerce by reducing transmission congestion, and stimulate investment in new transmission facilities.
Sukumar	Brahma	Power System Protection in the Era of Smart Grid	Webinar	Advances in sensing, communication and computing have potential to refine, or even redefine the conception and implementation of Power System Protection. Increased computing power at low cost has provided opportunities to implement more computation-intensive methods/algorithms in real time. Phasor Measurement Units (PMUs) providing faster and diverse synchronized measurements over a wide area, with new communication options arepart of the emerging technology. These advances can be the potential enablers of new paradigms in Protection. At the same time, penetration of widespread current-limited renewable resources has disrupted some fundamental assumptions on which protection has been designed over the years. This talk will provide an overview of the state of the art and review challenges, promises, and conception of the changing protection paradigm in smart grid.	Protection of Microgrids	Tutorial	Protection of power distribution systems has been designed for decades under the assumptions that that system is single-sourced and radial. Due to the advent of distributed generation (DG) the distribution systems have become multi-sourced. In recent times, due to the fast-evolving concept of microgrids, distribution systems will not only become multi sourced, but also be required to safely operate in grid-connected and islanded modes. There will be a major impact on Protection due to this transition to microgrids. Challenges arise from 1) extreme difference in the magnitude of fault currents fed by substation (grid) and by the DG units, 2) fault response from inverter interfaced renewable sources being radically different than the response of the conventional DG units, 3) impact of inverter controls on normal operation of microgrids and detection of faults, 4) design considerations and cost of upgrades in protection system required to convert a conventional distribution feeder into a microgrid.			

First Name	Last Name	Presentation Title	Presentation Type	Abstract	Presentation #2 Title	Presentation #2 Type	Abstract #2	Presentation #3 Title	Presentation #3 Type	Abstract #3
Edson	da Costa Borton	Electrical machines in a changing world	Webinar	In the late XIX century the electrical machines allowed the transformation of a handmade and steam based production to an electricity based production in the processes and power plants. The main machines used that time were asynchronous machine and DC machine in the final use of electricity, the synchronous machine for the power generation, and transformers in both applications, including transmission of power. Nowadays, a new era in electricity application have been driving the evolution of the electrical machines to meet requirements of the electrification of the transportation, variable speed power generation, and the sought of the highest efficiency in both generation and final use of the power. Reluctance, permanent magnet, magnetic coupling, hybrid, memory magnetic, and several kinds of brushless machines are examples of these new employed technologies to obtain higher power-to-mass ratio with higher efficiencies. The evolution of the electrical machines, new employed materials, new metrics in the machine design to achieve such desired results, and tools for the mathematical analysis will be presented.	Energy Demand forecast allied to energy efficiency measures	Webinar	The title of this speech is provocative. In spite energy is consumed, and power is demanded, energy demand talks about average power. The problem is that the society's average power demand has been increasing in such a rate which is difficult to be met by the available generation. It has been seen that the society surfers of a philosophical problem: the need for speed. If energy is a general change, power is the velocity in which this change occurs. On the other hand, this speed reduction can only be achieved by means of a single or a joint of three ways: the awareness of the society with the adoption of energy efficient procedures; the elimination of obvious waste with the improvement of the processes; and the development of new efficient technologies. This speech will try to provoke the audience with power and energy definitions, energy demand forecast techniques, and go deep in the aforementioned energy efficiency measures, allowing for research and critical reasoning in this area.	Renewable power generation and storage systems	Webinar	Renewables are known as those sources that are eventually available and recomposed by the nature. Bio, solar, wind, and hydro, are the main representatives of this class of power generation. Intermittence of the primary energy is the main common drawback of those sources. In order to reduce the effects of the intermittence, several techniques of storage systems have been developed to accommodate the several power and time scaled issues. At the end, the audience will be able to read, understand, and talk about the intermittence of those kinds of primary energy, the role of the several techniques employed to the store energy, and the power supply based on renewable generation. Simple methods to design and evaluate storage systems based on the power and time scale problems will be presented.
Jinliang	He	Lightning Protection Technologies of Power Systems	Webinar	Lightning protection of transmission line is very important for power system, since 40-70% of the accidents of transmission lines were caused by lightning in the world. Usually, the electrogeometric model (EGM) is used to analyzed the lightning shielding failure of transmission line, but whether the EGM is suitable to analyze the lightning shielding failure of ultra-high voltage transmission lines is a debatable issue. This lecture will introduce leader propagation model for shielding failure analysis. On the other hand, the lightning protection measures, including grounding devices for transmission towers, transmission line surge arrester, and protection gaps for insulators are all introduced.	The Development and Applications of Surge Arresters for Lightning Protection of transmission Lines	Webinar	According to the statistical results of power system failure classification, about 40-70% of accidents of transmission lines in high voltage power system were caused by lightning in the world. Since 1980's, the polymeric ZnO surge arresters have been developed quickly and put into operations on transmission lines. The lightning protection performances of transmission lines have been improved highly due to installation of these polymeric line surge arresters, and the line surge arrester has been regarded as the best method for lightning protection of transmission lines. This lecture will address the key issues of line surge arresters for lightning protection of transmission line.	The Development of Gas-insulated Transmission Lines	Webinar	Traditional overhead transmission lines have some limitations, including serious impacts on landscapes and nature, human living space compression by their generated electromagnetic environment, and system failures easily caused by natural disasters. So, a future power transmission mode should solve the contradiction between electric power transmission and natural environment and urbanization. Gas-insulated transmission line (GIL) is a good solution for power transmissions of large capacity. AC GILs now have been applied in special areas to replace overhead transmission lines, such as through landscapes, entering into metropolises, going out hydroelectric stations. On the other hand, HVDC GILs have been being studied focusing on long-distance large–capacity power transmissions. GIL is a typical interdisciplinary, covering new materials, ecofriendly insulation gas, high voltage, and electromagnetic fields, the objective of this lecture is to present the development and application of HVAC and HVDC gas-insulated transmission line technologies, especially emphases on the studies and applications of novel technologies.
Syed	Islam	A Journey on Frequency Response Analysis for Power Transformer Fault Detection- Offline to Online	Webinar	Frequency Response Analysis (FRA) is now universally accepted technique to detect Power Transformer winding radial and axial movement, core deformation and other types of faults. Traditional techniques of high voltage electrical equipment fault detection are not suitable for mechanical type fault monitoring and detection in transformers. FRA's are recognised in successfully diagnose HV/LV winding movement, buckling, clamping pressure integrity, core movement types of faults. In Australia, the speaker pioneered the FRA technique while working as Pacific Power funded Research Academic at The University of Newcastle 1995-1997. Since then he has continued researching on FRA from mainly offline technique to now online technique while working at Curtin University, Perth, Australia from 1997-2018 collaborating with Chongqing University, Xian Jiatong University, Queensland University of Technology, BC Hydro in Canada and Western Power. In this talk, the speaker will present a summary account of technology evolution on FRA from offline to online Worldwide.	Condition Monitoring of Wind Turbine Generators	Webinar	In order to reduce operation and maintenance cost of wind energy conversion systems (WECS) and to improve its availability and reliability, an effective online condition monitoring technique should be adopted. Owing to a rapid increase in WECS, condition monitoring has recently attracted many researchers and detecting incipient mechanical and electrical faults to avoid any catastrophic failures to wind turbines. Condition monitoring test rig model has been widely used to understand and to analyze the behavior of wind turbines under various fault conditions. In this talk, results from a laboratory scale test rig model will be presented to investigate the impact of various mechanical and electrical faults on the overall performance of the system. This will include harmonic impact from front end rectifiers on stator current resulting in failures of many wind turbine generators on extreme temperatures.	Technological Advances in Grid Code Compliance, High Penetration and Drive Train Diagnostics of Wind Energy Conversion Systems	Webinar	Wind Power Generation continues to grow and is the key contributor to large scale variable power connected to grid in the renewable energy generation mix. Utility transmission system operators impose stringent grid codes internationally. The emphases are given to low and high voltage ride-through capabilities, active and reactive power responses during and after faults, and reactive power (voltage) regulation. Rapid technological developments are in progress to meet various grid code requirements. In this talk, fault ride through techniques for all four types of wind energy conversion systems (WECS) are covered and some case studies are presented involving enabling technologies in grid code compliance, congestion management, and drive train diagnostics.
Dragan	Jovcic	DC Transmission Grids: Components, Modelling, Control and Protection Challenges	Webinar	The primary motivation for DC grid development is the need to interconnect multiple HVDC links located in close proximity, and to enable power trading between all DC terminals. This brings benefits of better utilisation of assets, better reliability and security of power transfer, better efficiency, enhanced power trading and operating flexibility, and all the advantages of interconnected systems (reserve sharing, control, ..). Large DC grids, say over 20 terminals, will be required to operate with the same level of power security, reliability and similar losses as traditional AC grids. DC grids will however be much different from traditional AC systems, and numerous technical challenges have been identified, related to DC grid component development, modelling, control and protection aspects.	DC/DC converters for DC Transmission Grids	Webinar	The primary motivation for DC grid development is the need to interconnect multiple HVDC links located in close proximity, and to enable power trading between all DC terminals. This brings benefits of better utilisation of assets, better reliability and security of power transfer, better efficiency, enhanced power trading and operating flexibility, and all the advantages of interconnected systems (reserve sharing, control, ..). Large DC grids, say over 20 terminals, will be required to have same level of power security, reliability and similar losses as AC grids, and yet they will have different topology from AC systems, protection systems will be much more challenging and system dynamics will be 1-2 orders of magnitude faster than with AC systems			
Chongqing	Kang	Integrating High Share of Variable Renewable Energy in Bulk Power Systems	Webinar	Countries around the world set aggressive goals for the very high share of renewables in future power systems. However, uncertainty and variability of the very high penetration renewables need more flexibility to balance the generation and load. This lecture will introduce some novel approaches to provide flexibility for power systems including concentrating solar power (CSP), cloud energy storage (CES), and multiple energy systems (MES). CSP is an emerging controllable renewable generation technique to accommodate the uncontrollable renewable energy. CES presents a new business model to share both centralized and distributed storages to explore their flexibility potential. MES exploits the synergy of electricity, gas, and heat systems to provide flexibility. In addition, data analytics on the demand side and renewable energy are proposed to have a better understanding of electricity consumption behaviors and renewable energy output stochastic characteristics and further contribute the accommodation of renewable energy. Finally, the lecture will provide some practice experiences from the provincial power systems with high penetration of renewable energy in China.	Modeling and optimization of multiple energy systems	Webinar	Multiple energy systems (MESs) bring together electric power, heat, natural gas, and other systems to improve the overall efficiency of the energy system. An energy hub (EH) models an MES as a device with multiple ports using a matrix coupling the inputs and outputs. It is an effective approach for the modeling of multiple energy systems. This presentation will revisit EH from a novel standardized matrix perspective. On this basis, the standardized matrix modeling is extended to fully consider the nonlinearity of different energy convertors. Optimal planning, operational simulation, reliability analysis, security regions definition of EH based on standardized matrix modeling approach will also be introduced. Finally, the lecture will provide some practices and lessons learned from real-world cases from countries around the world.	Smart meter big data analytics	Webinar	The widespread popularity of smart meters enables an immense amount of fine-grained electricity consumption data to be collected. Massive amounts of data need to be processed, translated into actual information, and incorporated into the operation and planning of the smart grid. This presentation will introduce recent advancements on smart meter data analytics, focusing on three aspects: electrical consumer behavior modeling, probabilistic load forecasting, distribution network analysis. For electrical consumer behavior modeling, the works about data compression, consumption pattern recognition, energy theft detection, personalized retail price design, socio-demographic information identification, etc., will be introduced. For probabilistic load forecasting, the lecture will introduce how to model the uncertainties in the processes of input feature, regression model, and output forecasts. For distribution network analysis, how smart meter data can be used for power flow approximation and topology identification will be discussed.

First Name	Last Name	Presentation Title	Presentation Type	Abstract	Presentation #2 Title	Presentation #2 Type	Abstract #2	Presentation #3 Title	Presentation #3 Type	Abstract #3
Emil	Levi	Integrated on-board battery chargers for electric vehicles	Webinar	To reduce the CO2 emissions and achieve the 80% reduction target by 2050, it is essential that the electric vehicle (EV) development and their adoption by the public are accelerated. This requires removal of one of the major obstacles, which is the so-called range anxiety. The first and the most obvious approach to relieving EV driver's range anxiety is to provide the vehicle with an on-board charger, so that the driver can charge the battery at any electric grid connection point. Such an on-board battery charger should provide means for both slow charging (from a single-phase grid) and fast charging (from a three-phase grid). A preferable solution for this purpose is the use of integrated on-board chargers: the idea is to reuse the existing components of an EV, which are already in place for the propulsion mode of operation. This lecture looks at the currently available solutions that integrate some or all of the already existing EV components into the charging process and then concentrates on the solutions based on machines and converters with more than three phases (multiphase systems). A whole range of entirely novel solutions, based on using machines with different phase numbers, have been developed in the last few years. All are characterised with the zero torque development during charging process. A further very important property of these solutions is that, in addition to the charging mode, vehicle-to-grid (V2G) operation is also possible without any modifications whatsoever. The stator winding configurations encompassed by the presentation are the symmetrical six-phase, asymmetrical six-phase, symmetrical and asymmetrical nine-phase and five-phase and all topologies enable connection to either three-phase or single-phase grid.	Multi-phase drive and generation systems	Webinar	Although multiphase (more than three phases) machines have been known for almost half a century, it is only in recent times that they are becoming more wide-spread in industrial applications. In addition to the obvious advantage of reducing the required power-per-phase and hence required semiconductor rating, multiphase systems offer a number of other advantages that make them suitable for specific but important niche applications. These all stem from the fact that, regardless of the number of stator phases, independent flux and torque control of an ac machine always requires only two independently controllable currents (two degrees of freedom). The remaining degrees of freedom can then be used for other purposes and this will be the subject of this lecture. The lecture is tutorial in nature and will commence with an introduction to the types of multiphase machines, principles of multiphase machine modelling, vector control, and multiphase voltage source inverter PWM schemes. 'Classical' (i.e. older) uses of additional degrees of freedom will be addressed next, including the multi-motor multiphase series-connected drive systems with reduced-switch-count inverter supply, use of the additional degrees of freedom for the purposes of achieving fault-tolerant operation, and torque enhancement by low order stator current harmonic injection. Next, more recent applications of the additional degrees of freedom will be considered. This encompasses capacitor voltage balancing in machines with multiple three-phase windings and multiple three-phase converters connected in series, realisation of fully integrated on-board fast (three-phase) and slow (single-phase) battery charging systems in electric vehicles, power sharing between three-phase windings in a multiphase machine with a multitude of said sub-windings, a braking method for induction motor drives with diode front-end rectifier, and advanced testing opportunities available in the machines with multiple three-phase windings. Basic concepts will be explained and illustrative examples will be provided throughout.	Multilevel multiphase drive systems: Topologies and PWM control	Webinar	Multilevel supply of a variable-speed drive can be realised using a single multilevel inverter with the machine's stator winding connected in star. Alternatively, the machine can be in so-called open-end winning configuration, where both sets of terminals are accessible and thus enable connection of an inverter. In the latter case, two inverters, each of two-level structure and with equal dc input voltage, can produce voltages across the machine phases that are the same as with three-level NPC inverter with doubled dc-link voltage. This lecture will discuss PWM control for the afore-said two types of multilevel supply and will deal with the more involved case of multiphase machines/inverters. The emphasis will be placed on space vector and carrier based PWM techniques and numerous different cases will be covered, including the use of unequal dc-link voltages in conjunction with the open-end winding structure. The means for controlling the open-end winding topology when a single dc source is used for the supply of both inverters will be discussed as well. The particular phase numbers that will be encompassed by the lecture are five, six, and seven. Experimental results, collected on induction motor drives for the said cases, will be included throughout. Further, the comparisons of different modulation techniques in terms of THD behavior will provide further information on the pros and cons of different PWM techniques.
Federico	Milano	A Continuum-based Approach to Frequency Estimation	Webinar	The conventional power system model for transient stability analysis is based on the assumption of quasi-steady-state phasors for voltages and currents. The crucial hypothesis on which such a model is defined is that the frequency required to define all phasors and system parameters is constant and equal to its nominal value. This model is appropriate as long as only synchronous machines regulate the system frequency through standard primary and secondary frequency regulators. In recent years, however, an increasing number of devices other than synchronous machines are expected to provide frequency regulation. These include, among others, distributed energy resources such as wind and solar. However, these devices do not generally impose the frequency at their connection point with the grid. There is thus, from a modeling point of view, the need to define with accuracy the local frequency at every bus of the network. The first part of the lecture presents an accurate yet simple and computationally inexpensive formula, namely, the frequency divider, to estimate such frequencies and, thus, improve the fidelity of the conventional power system model for transient stability analysis. The second part of the lecture focuses on a relevant application of the frequency divider, namely, the estimation of the rotor speeds of synchronous machines by means of phasor measurement units. This estimation is aimed at on-line monitoring of electro-mechanical transients and transient stability analysis. The dynamic state estimation is formally stated as a convex optimization problem and a thorough discussion of the sensitivity analysis of the optimal solution is provided. The results of several case studies serve to illustrate the behaviour of the frequency divider formula as well as the robustness against noise and bad data of the estimation of machine rotor speeds.	Stochastic Algebraic-Differential Equations for Power System Modelling and Dynamic Analysis	Workshop	Traditionally, the stability analysis of power systems has been based on approximated deterministic models whose dynamic behavior is dominated by synchronous machines and their controllers. However, in recent years, the increasing penetration of renewable energy resources, such as wind and solar, has motivated researchers and practitioners to rethink the modeling and simulation of modern electric networks. This seminar will discuss the modeling of uncertainty and volatility due to wind generation through stochastic differential-algebraic equations. Both Gaussian and non-Gaussian processes are considered in talk and particular attention is dedicated to the implementation of the autocorrelation of the processes. Computer implementation and numerical aspects are also discussed.			
Joydeep	Mitra	Energy Assurance with Renewable Generation	Webinar	Since the beginning of this century we have witnessed an acceleration in the adoption of renewable energy resources and technologies. Various forces – social, political, economic, regulatory and technological – have conspired to create a climate that fosters the development and proliferation of numerous technologies that enable the conversion, control and integration of renewable energy resources. Although the mix of renewable resources is diverse, ranging fromwind and solar to tidal and biomass, the bulk of today's investments are going into wind and solar, both of which are considered variable resources because they are available not upon demand, but upon the whims of nature. This creates several challenges and opportunities in exploiting their benefits, both when operating them in isolation and when operating them in coordination with other resources. Numerous solutions have been proposed for mitigating the challenges, ranging from storage and transmission expansion to demand response and "smart grid" control technologies. This talk will discuss the most significant factors affecting energy assurance in the presence renewable generation. It will investigate the use of energy storage to mitigate some of the challenges. It will discuss reliability metrics and targets, and a method for quantifying the notion of "firming" up an intermittent resource. Effects of resource availability and network constraints will be considered. The presentation will conclude with a discussion of another characteristic of renewable resources – low inertia – and how it impacts system reliability, and of ongoing research toward developing solutions for mitigating these impacts.	Grid Reliability: Evaluation, Applications and Emerging Issues	Tutorial	Over the last two decades we have witnessed sweeping changes across the electric utility industry, ranging from restructuring to modernization to widespread integration of renewable resources. Partly as a consequence of these changes and partly due to recent increase in the frequency of extreme weather events, grid reliability has emerged as an important concern to the industry. This tutorial is designed to educate those in the industry on reliability methods, applications in system planning and operation, and emerging issues. It is intended for a wide audience, encompassing practicing engineers, students and academics who work with grid operation and planning. It covers the following topics: An intuitive introduction to stochastic processes; system modeling for reliability; common methods of reliability assessment; Monte Carlo simulation. Reliability modeling and analysis of electric power systems: bulk power systems, distribution systems, and industrial systems. Reliability considerations in grid planning and operation; role in asset maintenance. Reliability with variable and low-inertia generation. Analysis of risk in power systems; understanding of causes and remedial measures. Emerging issues in grid reliability and broad strategies for mitigation.	Use of Energy Storage for Reliability Improvement of Renewable Generation	Webinar	Increasing penetration of renewable resources in the grid pose several challenges to reliable operation. Utilities have begun deploying energy storage technologies as a means of mitigating some of these challenges. Although the presence of energy storage ameliorates the reliability challenges posed by intermittent sources, a quantitative assessment of the exact amount of storage required to meet a reliability target or guarantee in the presence of intermittent sources is not trivial. This presentation examines some of the challenges posed by renewable generation and means of quantifying their impacts on grid reliability, and discusses approaches to mitigate them using energy storage. Applications to three types of systems – standalone, island-capable, and interconnected – are presented. The presentation systematically develops a mathematical method for determining the amount of storage required to meet a reliability target at a specific load point, and extends it to a more complex island-capable microgrid system with solar generation, and a grid-connected system with wind generation. It discusses reliability metrics and targets, and a method for quantifying the notion of "firming" up an intermittent resource. Effects of resource availability and network constraints are considered. The presentation concludes with a discussion of another characteristic of renewable resources – low inertia – and how it impacts system reliability, and of ongoing research toward developing solutions for mitigating these impacts.

First Name	Last Name	Presentation Title	Presentation Type	Abstract	Presentation #2 Title	Presentation #2 Type	Abstract #2	Presentation #3 Title	Presentation #3 Type	Abstract #3
Ali	Moshref	Fundamental of Power System Planning and Operation	Webinar	Grounding and bonding techniques are of the upmost importance in electrical system performance and overall cost. But above all, it plays an essential role in personnel safety and equipment protection. In this regard, engineers should have a good understanding of grounding and bonding issues and practical solutions to the most common problems. Participants will gain a general understanding of grounding and bonding methods, common issues and practical solutions:	Power Quality and Harmonics	Webinar	Power quality is of upmost importance to electrical engineers since it can greatly affect power system performance, design requirements, and project costs. Power system engineers have dealt with power quality issues for decades, and yet, despite this knowledge and experience, power quality still poses a challenge to daily system operations. Power Quality and Harmonics seminar is designed to help attendees understand the causes, effects, and methods of addressing various power quality problems. The seminar presents study approach, field measurement, and monitoring programs to familiarize attendees with the definitions and concepts used to evaluate power quality. The seminar introduces methods of modeling and simulating power systems for study purposes, and these methods are demonstrated using case studies of actual power quality problems. The effects of harmonics on various power system components and methods of reducing excessive harmonics will also be addressed. Power quality and harmonics standards and guidelines are also emphasized in this seminar.	Power System Grounding and Bonding	Webinar	Grounding and bonding techniques are of the upmost importance in electrical system performance and overall cost. But above all, it plays an essential role in personnel safety and equipment protection. In this regard, engineers should have a good understanding of grounding and bonding issues and practical solutions to the most common problems. Participants will gain a general understanding of grounding and bonding methods, common issues and practical solutions: •Understand the basic principles of grounding and bonding of electrical systems and equipment •Know the applicable standards and design methods •Know how to measure and improve an existing grounding and bonding system •Apply sound grounding and bonding techniques in designing new installations
Ming	Ni	Power System Security and Stability: Current Status and Development Trends	Webinar	Severe weather and equipment failure may cause security and stability problems in the power grid. Therefore, the power grid security and stability defense system is needed to escort the power grid and avoid the occurrence of blackouts. With the development of smart grids, the integration of power grids and communication and information technologies has become more and more close, and modern power grids have become a typical cyber-physical convergence system (Cyber-Physical System, CPS). Therefore, the traditional power grid security and stability defense system needs to be expanded in function to cope with new threats caused by communication failures and cyber -attacks. This lecture will first introduce the existing power grid security and stability defense system, and then introduce the power grid security and stability defense system considering communication risks and the architecture of grid side active defense system for cyber-attacks, respectively, including the key technologies and implementation methods	Smart Grid and Ubiquitous Power Internet of Things	Webinar	The word ubiquitous power plus the Internet of Things, is called Ubiquitous Power I oT, more specifically, should be called the ubiquitous energy IoT. The ubiquitous power Internet of Things is a ubiquitous manifestation and application of the Internet of Things in the power industry. It will link the power users and their equipment, power grid enterprises and their equipment, power generation enterprises and their equipment, suppliers and their equipment, as well as people and things, together. It can improve the efficiency and security of the power system. At the same time, it can generate shared data which can be used by power users, power grids, power suppliers, government, and other entities. It is the key for the power grid to evolve into energy internet	Regional and Inter-regional Value-Based Transmission Planning	Webinar	The traditional (bottom - up) transmission planning approach relies on local transmission planning entities to propose projects for system upgrades. The process of validating individual projects, ensuring that they properly integrate with their neighbor's plans and that they somehow achieve an overall energy and economic efficienci es is very resource intensive and time consuming. Alternatively, a value - based planning process could offer the prospect to bridge the impasse now thwarting interregional transmission planning coordination. It helps identify incentives for regions with l ow cost power to share aggregated societal benefits to lower overall consumer costs. The inter - regional simulation approach helps to reveal the transmission plan(s) that are most robust toward serving the wider interconnection, estimates the benefits to v arious parties in terms of reduced production costs, and provides a starting point for parties to begin negotiations and to allocate investment costs.
Luis (Nando)	Ochoa	Advanced Modelling of Smart Distribution Networks Using OpenDSS	Webinar	The increasing and future adoption of small-to-medium scale low carbon technologies such as wind power, photovoltaic systems and electric vehicles is and will pose significant technical and economic challenges on distribution networks. Medium and low voltage circuits have been designed to have no or limited controllability and hence are largely unmonitored. However, it is likely that they will become one of the first bottlenecks towards the decarbonisation of our power systems. Therefore, it is important to understand the impacts and the potential solutions in the context of Smart Grids. For this purpose, it is crucial to use simulation tools designed specifically for distribution networks and flexible enough to carry out sophisticated studies.	Making our Distribution Smarter and Low Carbon: A Regulatory Perspective	Webinar	This talk will give the vision of Smart Grids in the European context. First, the challenges to be faced by the distribution networks due to high penetrations of LCTs will be presented and discussed. The potential solutions that avoid reinforcements in the low and medium voltage networks will be discussed considering industrial Smart Grid projects in the UK.	New Approaches for the Control of Future Distribution Networks	Webinar	This talk will first introduce the potential problems or impacts of different penetrations of low carbon technologies on LV networks using a Monte Carlo approach to cater for the corresponding uncertainties involved. It will then present and discuss the benefits and drawbacks of some of the potential solutions that might allow higher penetrations without the need of traditional reinforcements. The work is based on different industrial Smart Grid projects in the UK hence it will provide insights on real European-style LV networks as well as the trialed technologies.
Guillermo	Rodriguez	Power Transformers up to 30 MVA Tutorial	Webinar	Agenda 1. Transformer Theory 2. ANSI Standards for Transformers 3. Pole Mounted Transformers 4. Pad Mounted Transformers 5. Dry Transformers 6. Small Power Transformers 7. Transformers Loss Evaluation 8. Why Transformers Fail 9. Transformer Maintenance	Tutorial on Distribution Systems	Tutorial	1. Distribution Systems Introduction 2. Distribution Systems Planning 3. Distribution Systems Regulation and Losses 4. Short Circuit calculations in Distribution Systems 5. Recloser, Sectionalizers and Fuses Application 6. Capacitor Application 7. Smart Grids			
Julio	Romero Aguero	Integration of Distributed Energy Resources (DER) and Electric Transportation in Distribution Systems	Tutorial	This tutorial will provide a review of industry leading practices for integration of DER (DG, DES, microgrids, Virtual Power Plants (VPP), etc.) and electric vehicles in distribution systems.	Distribution Reliability and Resiliency Assessment and Improvement	Tutorial	This tutorial will provide a review of leading industry practices, standards and methodologies for evaluation and improvement of reliability and resiliency for modern and future power distribution systems	Grid Modernization and Smart Distribution Systems	Tutorial	This tutorial will provide an overview of grid modernization activities and smart distribution systems around the world, and discuss objectives, modern equipment, technologies, leading industry practices, solutions and methodologies used by the electric power industry to modernize distribution grids. This tutorial will bring together all these aspects in a cohesive and holistic description that would allow attendees to understand this rapidly evolving and increasingly complex area.
Tapan Kumar	Saha	Transformer ageing diagnosis & condition monitoring	Tutorial	Large proportions of power transformers within electric utilities around the world are approaching the end of their design life. Many, perhaps most, seem to be operating satisfactorily. However, insulation degradation continues to be a major concern for these aged and expensive transformers. Insulation materials degrade at higher temperatures in the presence of oxygen and moisture. Although there are several chemical based diagnosis tools in practice for many years, no reliable electrical based diagnostics have become dependable to utility engineers. In recent years, new polarisation based diagnostic methods have been promoted complementary to the classical insulation resistance, power frequency dissipation factor and polarization index measurements. These new methods are based on time or frequency domain polarisation measurements. This seminar will outline time and frequency domain polarisation methods, and their interpretation schemes for assessing transformer ageing conditions. A number of new diagnostic tools along with expert systems have been developed by the speaker, which will be outlined in this seminar with a number of case studies implemented in utility substations. This research has been conducted with a number of Australian distribution and transmission utilities for more than 20 years with funding from the Australian Research Council.						

First Name	Last Name	Presentation Title	Presentation Type	Abstract	Presentation #2 Title	Presentation #2 Type	Abstract #2	Presentation #3 Title	Presentation #3 Type	Abstract #3
Chanan	Singh	Reliability Evaluation of Smart Grid including the impact of Cyber-physical Interactions	Webinar	As a result of the drive for the grid smartization, there is an ever increasing penetration of cyber technologies of monitoring, communication and control. For example legacy protection systems with hardwired architecture are being gradually replaced by computer and communication networks consisting of multi-functional and smart Intelligent Electronic Devices (IEDs). Two way cyber links with the smart homes provide opportunities for demand side management that were not available earlier. The enhanced use of cyber technologies will provide more flexibility and more opportunities for better control and communication but also increase complexity increasing the risk of wide spread outages. With the increasing penetration of these technologies one issue is cyber-security where deliberate attacks can cause wide spread outages or other dysfunctions. The other issue is impact of inherent malfunctions and failures in the cyber part which have the potential of widening the boundary of failures of the power grid.This talk will differentiate between these two issues and will be focused on addressing the later in detail. The state of art of the power system reliability methodologies will be reviewed indicating the need for including cyberphysical interactions in the grid reliability evaluation. It will be shown how ignoring these interactions can result in incorrect evaluation of reliability. A systematic methodology for considering the effect of cyber malfunctions on the power system reliability will be explored and future research issues will be indicated. The proposed approach can be used as a patch for the existing methodologies thus simplifying its implementation. The need for data and information for conducting such analysis will be discussed.	Wind Farm Diversification to Smooth Intermittency and Improve Reliability	Webinar	Due to the intermittent nature of the wind and the lack of efficient and economic means of storing energy, the main challenge in achieving high penetration of wind lies in ensuring power system reliability standards at reasonable costs. This talk will discuss the idea of consciously exploiting wind farm diversification as a means to reduce wind power variability and unpredictability. The steadier wind power outputs can better help serve the base load while relaxing the requirements on conventional generation backups. This approach may improve wind capacity credit, as shown by a study of a virtual wind power plant supplying moderate loads. This should significantly increase infrastructure development options and support broad market penetration.			
Sri Niwas	Singh	Estimation of Grid Harmonics in the Presence of Renewable Energy Sources	Webinar	Developments in the power electronics converter technology and control methodologies have been accelerated many folds in recent years and have made possible for the renewable energy sources (RESs) interconnection to the utility grid. Penetration of RES into the electric power system is growing rapidly across the globe owing to its environment friendly and several other important characteristics. The use of power electronics devices for interconnection of RES have resulted in severe harmonics pollution. Harmonics, apart from creating problems of equipments overheating, noise and communication interference at customer end, also increase the reactive power requirement of converters, damage filter capacitances, disturb controller functioning, increase losses in cables/transformers /machines, etc., and introduce unwanted torque harmonics in the rotating machines. The estimation of harmonics has become very important for design, analysis, tariff, control and monitoring purposes. Fourier transform based harmonics analyzer are available for the measurement of harmonics spectrum, however, it suffers from many limitations. As a result, intensive research has been focused on harmonics measurement and estimation in the recent years.	Integrating Small Generations to a Smart Grid Environment	Webinar	The main objective of this talk is to discuss the major challenges in integrating the wind power generation in the smart grid environment. The talk provides a platform to an in-depth discussion on the various challenges and their possible remedies in smart grid initiatives which will benefit participants from academic and R&D institutions, engineers of utilities and policy makers.	Issues and Challenges for Wind Power Integration into Power Systems	Webinar	This talk will discuss the various issues and challenged in grid connected wind power generation.
Enrique	Tejera	Substation Maintenance	Webinar	The seminar will cover aspects of substation schemes, substations configurations and substations maintenance procedures. It will cover the different components in a high voltage substation and all the security measures that have to be taken into consideration when operation and testing equipment. The course will identify the most commons tests applied for high voltage equipment such as breakers, transformers, batteries, switchgears, bus bars, protective relays and others. Also, it will include sample of how to implement and execute maintenance programs in an electrical power system.						
Srinivas (Siri)	Varadan	Asset Performance Management in Electric Utilities	Webinar	This session focuses on the basics of asset performance management in electric utilities. Key questions such as; what is APM, why is APM used and what technologies makes APM possible are discussed from a practical perspective. The session will also discuss the state of the art in APM systems and present utility best practices in this subject.	Asset Investment Planning for Electric Utilities	Tutorial	This tutorial focuses on the basics of risk management in electric utilities. Concepts related to risk, its measurement and mitigation are explained in the context of asset investment planning. The development of a common framework for risk measurement enabling the comparison of "apples to oranges" is explained with examples from the utility industry. Once project risks and associated financial cash flows are defined, the tutorial goes on to explain how portfolio optimization is applied to select the best set of projects that meet established corporate guidelines (mission) within key constraints (crews, budgets and time). The tutorial summarizes the best practices of scenario planning and optimizing capital spending.	Using the power of Data Analytics in Electric Utilities	Webinar	This session focusses on the use of field data, obtained from sensors monitoring field assets. The key question, "what to do with this data?" is the main topic. Use cases are presented demonstrating how data analytics can be used for determining asset health, criticality and remedial actions. The session also deals with the topic of decision making based on data driven facts. This includes diagnostics (what to do now?) based on current and past data, and prognostics (what to do in the future?) based on AI/ML techniques.
Pierluigi	Mancarella	Multi-Energy Systems: An introduction to the Smart Grid beyond electricity	Webinar	While the "smart grid" is key to moving towards a sustainable power system, decarbonisation of the entire energy sector calls for rethinking the role of electricity in a wider, whole-system context. It is therefore critical to understand how electricity interacts with end-use sectors such as heating, cooling and transport (which are all large contributors to greenhouse gas emissions), as well as and with different supply-side fuels (and particularly natural gas). In this respect, new concepts such as Multi-Energy Systems (MES), whereby multiple energy vectors and sectors are optimally integrated, can increase the overall system's performance (technically, economically and environmentally) from both the operation and the planning perspectives. In particular, such smart MES thinking, which includes a number of emerging topics such as "smart buildings", "smart communities" and "smart cities" as well as "power-to-heat", "power-to-gas", and integrated electricity-gas network modelling, has the potential to unlock value somehow hidden when considering only electricity and access new forms of flexibility that may be essential in future power and energy networks. However, significant challenges also arise in terms of the complexity of modelling and then operating and planning such integrated energy systems.	Power Systems Resilience: Concepts, Models and Assessment	Webinar	Due to their catastrophic impacts but low frequency, extreme weather, natural disasters and similar events (for instance driven by climate change) are treated as high-impact, low-probability events. Power systems, as one of the most critical infrastructures of the modern world, need to be resilient to such events to withstand their impacts and ensure the uninterrupted electricity supply. In fact, also based on recent historical electrical disturbances due to extreme weather, even though the occurrence of such events is rare, the severity of their potential impact calls for (i) developing suitable methodologies to model their impacts; (ii) introducing a resilience quantitative assessment framework and relevant metrics; and (iii) proposing and assessing relevant strategies to mitigate these impacts. In this talk, after introducing the general concept of power systems resilience to extreme weather, climate change and natural disasters, the key features that a power system must possess to be resilient to such major high impact low probability threats are discussed. This is done by presenting a relevant conceptual time-dependent resilience performance curve and appropriate resilience-oriented mitigation/adaptation measures. A comprehensive overview of the key modelling aspects, methodologies and metrics to consider when quantifying power systems resilience are also presented, based on a number of recent publications and projects in the UK (for windstorms) and Chile (for earthquakes and tsunamis). Focus is given to a probabilistic multi-temporal and multi-regional assessment framework based on optimal power flow and sequential Monte Carlo simulation and coupled with resilience models of the system components. More specifically, it is shown how generic fragility models of the transmission ordistribution system can be built to map the real-time impact of extreme events (with focus on wind events as well as earthquakes), on components' failure probabilities. Following the above assessment modelling, different resilience quantification indicators and metrics are introduced, in order to assess different hardening and smart, operational resilience enhancement strategies. Several case study applications relevant to individual and multiple events that hit transmission and distribution networks are presented, also illustrating the effect of different strategies to improve power system resilience. The results demonstrate how, by using a mix of infrastructure and operational indices, it is possible to effectively quantify system resilience to extreme weather, identify and prioritize critical network sections, and assess the technical benefits of different adaptation measures, based on both hardening (e.g., making the system more redundant or robust) and smart (e.g., by	Techno-economic modelling and optimization of smart buildings, smart districts, community-based energy systems, and microgrids	Webinar	The decrease in cost of distributed renewable energy sources (particularly PV) and energy storage and the ubiquitous penetration of ICT technologies are rapidly changing the power system landscape. In this context, the rise of the smart grid control-based operational paradigm to replace the classical asset-based investment-heavy paradigm to develop a cost effective low carbon energy system is creating new opportunities for end-users to participate in and profit from energy system and market operation. Smart buildings can thus exploit multi-energy vectors (e.g., electricity, heat, cooling, etc.) to flexibly meet their energy needs and sell services (e.g., reserves, local capacity support, etc.) to various actors (e.g., aggregators, retailers, network operators etc.). Further, smart buildings can be coordinated at the district level for optimal energy management of clusters of buildings or district energy systems. Special cases of such smart districts are represented by community-based energy systems, where resources can be optimally shared within the members of the community, and by microgrids that could operate in both islanded and grid-connected mode, with further reliability and economic benefits. Modelling and optimization of single/multiple buildings require comprehensive understanding of: (i) the energy services required by the building occupants; (ii) technical characteristics and constraints of the buildings, local and district-level distributed energy resources (including different types of storage), and different energy networks (e.g., electricity, heat, cooling, gas) that interconnect the buildings; (iii) the economic implications of multiple services that could be provided throughout the value chain to different actors; and (iv) what financial arrangements and risk-hedge strategies might be put in place to facilitate the development of new business cases for local energy systems considering relevant uncertainties. This talk provides a holistic overview of technical and economic modelling and optimization principles of smart buildings and districts, community-

First Name	Last Name	Presentation Title	Presentation Type	Abstract	Presentation #2 Title	Presentation #2 Type	Abstract #2	Presentation #3 Title	Presentation #3 Type	Abstract #3
Wenyuan	Li	Power System Risk/Reliability Assessment	Webinar	A lecture or seminar can include one or more topics listed above.- Outage models of system components - Parameter estimation in outage models - Elements of risk/reliability evaluation methods - Risk/reliability evaluation techniques for power systems - Application of risk/reliability evaluation to Transmission development planning - Application of risk/reliability evaluation to Transmission operation planning - Application of risk/reliability evaluation to generation source planning - Application of risk/reliability evaluation to selecting substation configuration - Application of risk/reliability evaluation to renewable energy systems - Application of risk/reliability evaluation to composite systems with renewable sources - Risk/reliability evaluation of wide area measurement and control systems - Reliability-centred maintenance - Probabilistic spare-equipment planning - Asset management based on condition monitoring and risk evaluation - Voltage instability risk assessment and its application to system planning - Probabilistic transient stability assessment	Probabilistic Power System Planning	Webinar	- Basic concepts of probabilistic planning - Load modelling in probabilistic planning - System analysis techniques in probabilistic planning - Probabilistic reliability evaluation - Economic analysis methods - Data in probabilistic planning - Fuzzy techniques for data uncertainty - Transmission network reinforcement planning - Retirement planning of network components - Substation planning - Single-circuit supply system planning A lecture or seminar can include one or more topics listed above.			