University of Nevada, Reno

The Department of Electrical and Biomedical Engineering, the IEEE Section of Northern Nevada, and the IEEE IAS UNR Student Chapter are pleased to jointly sponsor a presentation by



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## Energy Assurance with Renewable Generation

Monday, April 8th, 2019 at 12:00 pm. Scrugham Engineering & Mines, Room 234, UNR
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**Abstract:** 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 from wind 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 of 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.

**Dr. Joydeep Mitra** (PhD, FIEEE) is Associate Professor of Electrical Engineering at Michigan State University, East Lansing, Director of the Energy Reliability & Security (ERiSe) Laboratory, and Senior Faculty Associate at the Institute of Public Utilities. He received a Ph.D. in Electrical

Engineering from Texas A&M University, College Station, and a B.Tech.(Hons.) in Electrical Engineering from Indian Institute of Technology, Kharagpur. He has five years of industry and consulting experience ranging from power system hardware installation to modeling and simulation of energy markets, and eighteen years of academic experience. Prof. Mitra has conducted research in power system modeling, analysis, stability, control, planning and simulation, and is known for his contributions to power system reliability analysis and reliability-based planning. He has 200 publications and patents in the power systems area; he is co-author of the book, "Electric Power Grid Reliability Evaluation: Models and Methods," and of IEEE Standard 762, a standard on reliability reporting. Prof. Mitra's research has been funded by the U.S. National Science Foundation, the U.S. Department of Energy, U.S. National Laboratories, and several electric utilities. Prof. Mitra is a Fellow of the IEEE. He serves as an Editor for the IEEE Transactions on Power Systems and Power Engineering Letters. In the past he has served as Chair of the IEEE-PES Analytic Methods for Power Systems Committee, Chair of several IEEE-PES Subcommittees, and as an Editor for the IEEE Transactions on Smart Grid. Prof. Mitra engages actively in several IEEE activities such as organizing conference tracks and contributing to the development of IEEE standards.

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