DEPARTMENT of INDUSTRIAL ENGINEERING
UNIVERSITY of HOUSTON

FRIDAY SEMINAR SERIES
BROADEN HORIZONS | EXTEND MINDS

Dr. Chaoyue Zhao
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University of Washington
Seattle,WA

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Zoom Meeting ID: 970 7656 5407

Password: 477211

Distributionally Robust Optimization for Power System Operations and Resilience

Abstract: The power grid disruptions caused by rare extreme weather can bring catastrophic impacts to the power industry and the society in general. The evaluation and mitigation of disruption-related risks are often computationally prohibitive due to the complexity of the power system, uncertainty of weather conditions, and the combinatorial nature of component failures. In addition, the intermittent nature of renewable energy brings another challenge for the system operators to maintain a reliable power system. In this talk, we propose distributionally robust optimization models to assist power system operations and enhance the system resilience in face of uncertain renewable energy output and extreme weather conditions. The proposed approach integrates statistical and optimization methods to derive innovative decision-making under uncertainty models for unit-commitment problems. We consider the cases where the true probability distribution of random parameters is difficult to estimate accurately. Instead of assigning a probability estimate for the random parameter such as renewable energy output or system component failure, we consider a set of probability distributions (the ambiguity set) by taking advantage of data information. Our approach considers all possible distributions in the ambiguity set, and is hence distributionally robust. Meanwhile, it can benefit from available data and become less conservative than the classical robust optimization approaches.

Biography: Dr. Chaoyue Zhao is an Assistant Professor in Industrial and Systems Engineering, University of Washington. Before that, she was hired as the Jim & Lynn Williams Assistant Professor in Oklahoma State University. She obtained her PhD degree at the University of Florida in 2014 and B.S. degree in Fudan University in China in 2010. Dr. Zhao works on data-driven optimization and reinforcement learning methodologies to support strategic and operational planning in power systems management. She has received multiple grants from the federal agencies such as the National Science Foundation, Department of Transportation and Argonne National Laboratory. She is the recipient of awards including the runner up of the Pritsker Doctoral Dissertation Award, and Energy Systems Division Outstanding Young Investigator Award in IISE.