

IPUMSU

MICHIGAN STATE UNIVERSITY | INSTITUTE OF PUBLIC UTILITIES Regulatory Research and Education
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IPU Power Grid School 2019

April 29-May 1, 2019

IPU Grid School covers the engineering and economics of the modernization and transformation of electric utility systems across the supply chain for power, from generation to transmission to distribution.

Program Agenda - preliminary

Sunday

1:00-5:00 pm **Introduction to Public Utility Regulation [Beecher]**
240 min. Kellogg Center – Room 105
Optional preconference program (separate registration is required).
Recommended for those relatively new to public utility regulation.

Monday

7:30-8:30 am **Registration and Breakfast**
A full breakfast is provided daily at 7:30 am in the Lincoln Room Hallway.
Daily networking breaks are at 10:00 am and 3:00 pm.

8:15-8:30 am **Welcome and Introductions [Beecher]**
15 min. Kellogg Center – Lincoln Room – all sessions

8:30-10:00 am **Fundamentals of Power Systems and Grid Infrastructure Part 1 [Mitra]**
90 min. Characteristics of electric power components and systems. Transmission and distribution systems; distributed resources and microgrids. Interconnected systems and balancing authorities. Interconnection standards and interoperability. Island systems. Line losses.

10:15 -12:15 pm **Fundamentals of Electricity Markets, Economics, and Regulation Part 1 [Rose]**
120 min. Wholesale market structure, operation, economics, and pricing. Role of private, nonprofit, and public power. Regulatory jurisdiction and coordination for generation, transmission, and distribution. FERC regulation and key rulings. Grid access and the Public Utility Regulatory Policies Act (PURPA). Climate change and carbon regulation.

12:15-1:30 pm Lunch at the Brody Hall Cafeteria (voucher provided)

1:30-3:00 pm **Fundamentals of Electricity Markets and Economics Part 2 [Rose]**
90 min. Energy, capacity, and ancillary services markets and allocation rules. Renewable Energy Certificates (RECs). Regional transmission organizations (RTOs). Aligning wholesale and retail markets. Market performance and oversight. Impact of changing marginal costs. Choice and default service. Path dependence and sunk costs. Market and policy uncertainty.

3:15-5:15 pm 120 min.	Fundamentals of Power Systems and Grid Infrastructure Part 2 [Mitra] Grid congestion, abnormalities, and vulnerabilities. NERC and other standards for quality, reliability, and security. Supply-side capacity, efficiency, and expansion. Grid modernization and intelligence (smart grids).
5:30-6:30 pm	Wine and Cheese Networking Reception
Tuesday	
8:30-10:00 am 90 min.	Grid Integration and Modeling for Distributed and Variable Resources [Veselka] Engineering properties and efficiency of energy resources. Changing fuel mix. Relevance of scale. Value, costs, and benefits of renewable energy resources. Locational marginal pricing (LMP). Aggregation, bidding, and dispatching. Energy resource mapping tools. Modeling capacity expansion.
10:15-12:15 pm 120 min.	Grid integration (continued) Case studies.
12:15-1:30 pm	Lunch at the Brody Hall Cafeteria (voucher provided)
1:30-3:00 pm 90 min.	Integrated Resource and Transmission Grid Planning [TBA] System and regional planning and coordination. Forecasting supply and demand. Supply and demand portfolios. Integrating wires resources. Resource and grid neutrality and governance. Impact of distribution developments on transmission. Planning under technological uncertainty. Modeling and evaluation. Flexible and modular design.
3:15-5:15 pm 120 min.	Distribution System Optimization, Management, and Planning [Murray] Increasing challenges for distribution systems. Beyond advanced metering infrastructure. Policy-driven metrics for innovation and optimization. Efficiency, flexibility, and cost criteria. Operating platforms. Distributed energy resource management systems (DERMS). Distribution management systems (DMS/ADMS). Volt-VAR Optimization. Investment and deferrals. Non-wires alternatives. Energy efficiency and demand response. Investing on both sides of the meter.
Wednesday	
8:30-10:00 am 90 min.	Power Grid Interdependency, Vulnerability, and Security [Ten] Transmission and distribution grid vulnerabilities. Hardware and software solutions. Cyber-security assessment and protection. Utilities, big data, and cloud storage. Data security and privacy. Evolving threats to reliability and resilience.
10:15-12:15 pm 120 min.	Grid Architecture and Technologies for Ensuring Reliability and Resilience [Murray] Problem definition. Evaluating options. SCADA systems. Distribution automation. Fault Location Isolation and Supply Restoration (FLISR). Automatic circuit reclosers. Utility-scale and distributed storage. Microgrids. Grid-edge technologies and innovation. Autonomous power systems and virtual power plants. Next generation smart grids. Practical solution sets. Experiments and pilots.
12:30-2:00 pm 90 min.	Working Lunch and Discussion of the Future of Electricity Grids, Business Models, and Regulation [Beecher, et al.] Trends in electrification (NREL, EPRI). Incentives for innovation and modernization. Disruption, defection, and the death spiral. Competing energy futures and business models. Alternative regulatory policies. Political, cultural, and leadership issues.

Program Faculty

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Program Information

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Free internet access is available throughout the Kellogg Center using the login MSUnet Guest.

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Presentations and supplemental materials are available to all attendees. Please navigate to the attendee link on the program web page and enter the program password: _____.

Submitting questions during the program

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