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IPU Power Grid Course 2020

May 4-5, 2020 – **Live Online Learning**

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

Program Agenda

Monday

9:00-10:45 am
105 min.

Fundamentals of Power Systems and Grid Infrastructure Part 1 [Mitra]
Characteristics of electric power components and systems. Transmission and distribution operations and planning. Impact of developments in distribution on transmission. Distributed resources and microgrids. Interconnected systems and balancing authorities. Interconnection seams, standards, and interoperability. Island systems. Line losses and solutions.

11:00-12:30 pm
90 min.

Fundamentals of Electricity Markets, Economics, & Regulation Part 1 [Rose]
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 orders. Grid access, neutrality, and the Public Utility Regulatory Policies Act (PURPA). Emissions and carbon regulation.

1:15-2:45 pm
90 min.

Fundamentals of Electricity Markets, Economics, & Regulation Part 2 [Rose]
Energy, capacity, and ancillary services markets and allocation rules. Renewable Energy Certificates (RECs). Regional transmission planning, operation, and organizations (RTOs). Market performance and oversight. Impact of changing marginal costs. Choice and default service. Stranded and sunk costs. Market and policy uncertainty.

3:00-5:00 pm
120 min.

Fundamentals of Power Systems and Grid Infrastructure Part 2 [Mitra]
Grid congestion, abnormalities, vulnerabilities, and emerging threats. NERC and other standards for quality, reliability, and security. Supply-side capacity, efficiency, and expansion. Utility-scale and distributed storage. Distribution grid operating platforms and automation technologies. Grid modernization and smart grids. Grid architecture for physical and cyber security, reliability, and resilience.

Tuesday

9:00-12:00 pm
180 min.

Grid Integration & Modeling for Distributed & Variable Resources [Veselka]
Engineering properties and efficiency of energy resources. Portfolio diversity and changing fuel mix. Relevance of scale, location, and time variability. Value, costs, and benefits of renewable energy resources. Locational marginal pricing (LMP). Day-ahead and hour-ahead scheduling and real-time dispatch. Energy imbalance markets (western U.S.). Long-term reliability assessment and modern integrated resource planning.

12:45-4:00 pm
195 Min.

Clean Energy Transition, Climate Action, & the Future of Grids and Their Regulation [Craig and Beecher]
Climate change impacts on power systems. Decarbonization, net-zero and negative emissions, and carbon capture. High penetration of renewables. Role of nuclear power. Long-duration storage. Efficiency, demand response, and aggregation. Distribute resources and virtual power plants. Price and financial incentives to drive the transition. Grid edge and non-wires alternatives. Price and financial incentives to drive the transition. Forecasts and trends in demand and electrification. Technological uncertainty, flexible design, and optimization. Prudent utility and regulatory models. Pandemic impacts. Discussion.

4:00 pm **Program Adjourns**

IPU Power Grid Course 2020: Program Faculty

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