

IPUMSU

MICHIGAN STATE UNIVERSITY | INSTITUTE OF PUBLIC UTILITIES Regulatory Research and Education
517.355.1876 | 517.355.1854 fax | ipu.msu.edu | ipu@msu.edu



IPU Grid Course I:

Engineering Economics of the Supply Chain for Power

March 9-11, 2021 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

Tuesday

- | | |
|---------------------------|--|
| 10:00-11:20 am
80 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. |
| 11:40-1:00 pm
80 min. | Fundamentals of Power Part 2
Interconnected systems and balancing authorities. Interconnection seams, standards, and interoperability. Island systems. Line losses and solutions. Grid congestion, abnormalities, vulnerabilities, and emerging threats. |
| 2:00-3:20 pm
80 min. | Fundamentals of Power Part 3 [Mitra]
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 reliability and resilience. |
| 3:40-5:00 pm
80 min. | Emerging Technologies, Digitalization, and the Grid Edge [Mulder] |

Wednesday







- | | |
|---------------------------|--|
| 10:00-11-20 am
80 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 and neutrality. |
| 11:40-1:00 pm
80 min. | Fundamentals of Electricity Markets Part 2 [Rose]
Public Utility Regulatory Policies Act (PURPA). Regional transmission planning, operation, and organizations (RTOs). Market performance and oversight. Impact of changing marginal costs. Stranded and sunk costs. |

- 2:00-3:20 pm
80 min. **Fundamentals of Electricity Markets Part 3** [Rose]
Choice and default service. Market and policy uncertainty. Price and financial incentives to drive the transition. Retail markets, default service, and Texas.
- 3:40-5:00 pm
80 min. **Developments in Energy, Capacity, and Emissions Markets** [Taruffelli]
Energy markets and allocation rules. Capacity market design, structure, economics, and performance, and pricing. Recent FERC orders on capacity markets. Demand-side participation in energy markets and capacity markets. Interaction of environmental regulations with energy and capacity markets. Federal investment or production tax credits and their effect on energy markets. Regional cap-and-trade programs. Trends and forecasts in electricity demand and market implications. Pandemic impacts on demand.

Thursday

- 10:00-11:20 am
80 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.
- 11:40-1:00 pm
80 min. **Grid Integration & Modeling Part 2** [Veselka]
Locational marginal pricing (LMP). Day-ahead and hour-ahead scheduling and real-time dispatch.
- 2:00-3:20 pm
80 min. **Grid Integration & Modeling Part 2** [Veselka]
Energy imbalance markets (western U.S.). Long-term reliability assessment and planning.
- 3:40-5:00 pm **Grid Integration & Modeling Part 3** [Veselka]
- 5:00 pm **Program Adjourns**

IPU Power Grid Course 2021: Program Faculty

	<p>Janice BEECHER (beecher@msu.edu) Director, Institute of Public Utilities, Michigan State University Ph.D., Political Science, Northwestern University www.linkedin.com/in/janice-beecher-33a61810</p>
	<p>Joydeep MITRA (mitraj@msu.edu) Professor, Electrical and Computer Engineering, MSU Ph.D., Electrical Engineering, Texas A&M www.egr.msu.edu/~mitraj/profile.html</p>
	<p>David MULDER (dave@openenergysolutionsinc.com) VP, Strategy and Solution Development, Open Energy Solutions, Inc. M.B.A., Administrative Management, University of Wisconsin www.linkedin.com/in/dave-mulder-81b2615/</p>
	<p>Kenneth ROSE (ken@kenrose.us) Independent Consultant and Senior Fellow, Institute of Public Utilities, MSU Ph.D., Economics, University of Illinois at Chicago www.linkedin.com/in/ken-rose-738a4365/http://www.kenrose.us/id1.html</p>
	<p>Brittany TARUFELLI (btarufelli@lsu.edu) Assistant Professor, Center for Energy Studies, Louisiana State University Ph.D., Economics, University of Wyoming https://lsu.edu/ces/about/facultystaff/tarufelli.php https://www.linkedin.com/in/brittany-tarufelli/</p>
	<p>Thomas VESELKA (tdveselka@anl.gov) Principal Computational Engineer-Energy Systems, Argonne National Laboratory M.S., Synoptic Meteorology, Northern Illinois University www.anl.gov/profile/thomas-d-veselka</p>

IPUMSU

MICHIGAN STATE UNIVERSITY | INSTITUTE OF PUBLIC UTILITIES Regulatory Research and Education
 517.355.1876 | 517.355.1854 fax | ipu.msu.edu | ipu@msu.edu