

Course Syllabus

ISEN 404 Resource Markets Design, Regulation, and Reform Winter 2021

Northwestern University

Instructor:

Mark Pruitt - The Power Bureau; Former Director of the Illinois Power Agency
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Guest Lecturers (Invited):

Rishi Garg, Federal Energy Regulatory Commission
MeLena Hessel. Environmental Law and Policy Center
Roseann Koneval. Ranger Power
Ann McCabe. The Regulatory Assistance Project
Melville Nickerson. Government Relations, NRG
Katie Papdimitriu, Policy Advisor to the Chairman, Illinois Commerce Commission
Susan Satter. Office of the Illinois Attorney General
Chuck Sutton, MC-Squared Energy Services
Michael Strong. Funkhouser, Vegosen, Liebman & Dunn

Office Hours: By appointment

Classroom: Tech L251

Class Timing: Winter Quarter runs January 3 – March 11, 2022, with exams from March 14-18, 2022;
Class meets on Tuesdays and Thursdays from 9:30 – 10:50 a.m.

Course Synopsis: This course will explore the evolution of the natural resource markets in the United States through the lens of the regulatory and quasi-governing agencies that have shaped their structure. The course will focus on electric power markets but will compare these market structures with those that govern water and other relevant systems. Students will also study current state and federal policy innovation creating or slowing current market reform.

Course Goals: This course will provide students with an understanding of federal, state, and regional policy and market stakeholders that impact the functioning of US wholesale and retail electric power markets. Students will develop a deeper understanding of the end-to-end transport of electricity, the multi-faceted value proposition of power and storage assets, and how public policy can drastically affect consumer pricing and the adoption of new technologies:

- Understand electric utility regulatory history, and its impact on market design, at both the wholesale and retail level
- Identify the role of key local, state, and federal regulators and market administrators, the interplay of their various authorities, and how various policies have increased or decreased their market relevance
- Analyze a variety of policy-based market-making tools to incentivize or dis-incentivize various forms of energy
- Compare and contrast the work of various state-level agencies to reinvent their markets design

Grading/Assessment:

Grading will be based 30% on class participation and 70% on exams and written assignments. Written assignments will include weekly short essays of roughly 2 pages (20% of total grade), a mid-term paper (20%) and a final paper (30%). Class participation (30%) will include engagement, ownership and mastery of discussion topics.

All questions and problems regarding grades must be presented in writing within one week after the test, homework, or project has been returned. The grading scale is fixed, please do not wait until the end of the quarter if you are concerned about the direction of your grade. Grades will be assigned based on all the work you have completed during the semester using the following scale:

A	93.333 to 100	C	73.333 to 76.666
A-	90.000 to 93.333	C-	70.000 to 73.333
B+	86.666 to 90.000	D+	66.666 to 70.000
B	83.333 to 86.666	D	63.333 to 66.666
B-	80.000 to 83.333	D-	60.000 to 63.333
C+	76.666 to 80.000	F	< 60.000

Course Readings:

Weekly discussions will draw on materials for the below texts, reports, and primers:

- "Enron – The Smartest Guys in the Room" (video)
- FERC State of the Markets Energy Primer: A Handbook for Energy Market Basics
- ComEd Deferred Prosecution Agreement
- FirstEnergy Corrupt Activity Complaint
- Electricity Regulation In the US: A Guide (Regulatory Assistance Project)
- The US Electricity Industry after 20 Years of Restructuring
- State of the Market Report for PJM
- Restructuring Recharged: The Superior Performance of Competitive Electricity Markets
- Office of Retail Market Development Annual Report
- The Regional Greenhouse Gas Initiative: Background, Impacts, and Selected Issues
- Investment of RGGI Proceeds
- Illinois Nextgrid Report
- A Journey Across the 51st State
- IPA Long Term Renewable Resources Procurement Plan
- Water Markets in the Western US: Trends and Opportunities
- Groundwater Trading as a Tool for Implementing California’s Sustainable Groundwater Management Act
- National Plug-In Electric Vehicle Infrastructure Analysis

Instructor may also assign a number of industry news services to discuss timely/current updates in Markets Design and Regulation that are illustrative of core course topics.

Midterm: 10-page critical assessment of one or more key elements of the recently enacted Climate and Equitable Jobs Act, or approved alternative topic.

Final: 10-page recommendation memo that proposes solutions to deficiencies identified in the student’s Midterm, or approved alternative topic.

CLASS OUTLINE

<p>Week 1 (1/4, 1/6). From Edison to Enron: The evolution of the electric power industry</p> <p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Key elements of the utility system: Generation, Transmission, Distribution • Edison and the revolution of the centralized power generation at economic scale • Insull and the birth of the modern electric grid, PUCs, and the natural monopoly model in exchange for cost-of-service regulation • The Federal Power Act and the Public Utility Holding Company Act (1935) • Creation of Independent Power Producers, ISO's and RTO's • Deregulation experience and policies Texas, California, Illinois, Britain
<p>Week 2 (1/11/, 1/13). Regulatory Authorities and their Functions</p> <p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Federal – FERC, NERC, USDOE, NRC • State – Public Utility Commissions / Environmental Protection Agencies • Non-governmental - NARUC
<p>Week 3 (1/18, 1/20). Foundations of Wholesale Markets</p> <p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Order 888 (1996) – “open access non-discriminatory transmission services” • Order 2000 (2000) – creation of RTOs/ISOs • Energy Policy Act (2005) – transfers utility regulation from SEC to FERC • Balance between Federal and State authority over markets
<p>Week 4 (1/25, 1/27). Operations of Wholesale Power Markets</p> <p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Market Functions: Capacity vs. energy-only; Energy imbalance vs. full requirements • Price Formation (Energy, Capacity) • Mechanisms to internalize environmental externalities • Climate change and risk management • Natural capital and ecosystem services
<p>Week 5 (2/1, 2/3): Retail Power Markets</p> <p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Infrastructure investment, public good and public-private partnership • Distributed generation, battery storage • The promise of innovation from retail competition • Net metering policies in competitive retail markets • FERC Order 2222



Week 6 (2/8, 2/10): Policy-based Market-Making
<p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • RPS/carve-outs • RECs • Net Metering • Efficiency Requirements • Carbon pricing
Week 7 (2/15, 2/17): Regulatory Impact of Smart Grid
<p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Supply Chain – extraction, refining, distribution, storage • Coal v. Oil v. Natural Gas markets • Climate, carbon pricing, and stranded asset risk
Week 8 (2/22, 2/24): Current Case Studies in Market Reform
<p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • California (AB2514 Storage Mandates) • New York (NYREV), • Illinois (CEJA) • Hawaii (Electric’s Grid Modernization Strategy) • Puerto Rico • Texas (SB 3 and SB 4)
Week 9 (3/1, 3/3): Water-Related Markets
<p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Water demand – residential vs. industrial vs. agricultural and varying pricing structures • Water rights and priority access • Social welfare and “basic rights” • Privatization and Water Banking
Week 10 (3/8, 3/11): Transportation-Related Markets
<p><u>Description/Topics:</u></p> <ul style="list-style-type: none"> • Fuel source – oil, ethanol and next-gen biofuels, EVs • Fuel economy standards • Infrastructure maintenance and taxation • Case study: who owns charging infrastructure in competitive markets?

COVID-19 Classroom Expectations Statement

Students, faculty, and staff must comply with University expectations regarding appropriate classroom behavior, including those outlined below and in the [COVID-19 Code of Conduct](#). With respect to classroom procedures, this includes:

- Policies regarding masking and social distancing evolve as the public health situation changes. Students are responsible for understanding and complying with current masking, testing, Symptom Tracking, and social distancing requirements.
- In some classes, masking and/or social distancing may be required as a result of an Americans with Disabilities Act (ADA) accommodation for the instructor or a student in the class even when not generally required on campus. In such cases, the instructor will notify the class.
- No food is allowed inside classrooms. Drinks are permitted, but please keep your face covering on and use a straw.
- Faculty may assign seats in some classes to help facilitate contact tracing in the event that a student tests positive for COVID-19. Students must sit in their assigned seats.

If a student fails to comply with the [COVID-19 Code of Conduct](#) or other University expectations related to COVID-19, the instructor may ask the student to leave the class. The instructor is asked to report the incident to the Office of Community Standards for additional follow-up.

Class Recording

This class or portions of this class will be recorded by the instructor for educational purpose and available to the class during the quarter. Your instructor will communicate how you can access the recordings. Portions of the course that contain images, questions or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term.

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact [AccessibleNU](#). Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University’s [Copyright Policy](#), faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

Expectations for Class Participation

Being prepared for class is about more than just showing up, it’s also about making sure you’ve completed the readings, homework, etc. so that you are able to make thoughtful contributions during class. Sitting silently and/or being unprepared can damage your participation grade. When in a virtual class, we expect students to keep their camera and mute on as much as possible. When in the classroom, we expect students to keep their phones off and put away.

Academic Integrity

Academic integrity is taken very seriously at Northwestern. Students are responsible for reading and understanding Northwestern’s Academic Integrity policies. All suspected violations will be reported to the McCormick College of Engineering’s Dean’s Office. These include cheating, plagiarism, fabrication, unfair advantage, unauthorized collaboration, and aiding and abetting of academic dishonesty. Students found in violation of academic integrity may receive a zero on the assignment or a failing grade for the course and may be suspended or permanently expelled from the University. See [Academic Integrity: A Basic Guide](#) for more information.

The Writing Place



When working on writing assignments for this class, I encourage you to visit the Writing Place, Northwestern's peer writing center. You will work with juniors and seniors who have been trained to provide you feedback and assistance on any type of writing at any stage in the writing process. They will not edit your work. Rather, they will work with you to brainstorm ideas, organize or outline an essay, clarify your argument, document your sources correctly, or refine grammar and style.

Accessibility Statement

Northwestern University is committed to providing the most accessible learning environment as possible for students with disabilities. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process (e: accessiblenu@northwestern.edu; p: 847-467-5530). If you already have established accommodations with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodations. Disability information, including academic accommodations, is confidential under the Family Educational Rights and Privacy Act.

Illness and Medical Leave of Absence

Review the University's [policy](#) on missing academic work due to illness. Your instructor cannot waive an assignment missed due to illness unless the illness can be verified (e.g., by University Health Services or other licensed health professionals).

Discrimination and Sexual Harassment

Northwestern's Policies on Discrimination, Harassment, and Sexual Harassment apply to all members of the University community, including students, staff, faculty, and third parties. Any student, staff, faculty member, or third party who believes that they have been discriminated against or harassed on the basis of their race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, pregnancy, parental status, marital status, age, disability, citizenship, veteran status, genetic information or any other classification protected by law, should contact the Office of Equity at (847) 467- 6571. Additional information about the University's discrimination and harassment policies, including the campus resources available to assist individuals with discrimination or harassment concerns, is available online on the [Office of Equity Website](#). Students, staff, and faculty who report harassment, discrimination, or sexual misconduct are also protected under the [University's Policy on Non-Retaliation](#).

Sexual Misconduct and Reporting

Northwestern University is committed to fostering an environment where students are safe and free from sexual misconduct. [Confidential resources](#) are available to those who have experienced sexual misconduct. Faculty and instructors are not confidential resources and are required to report incidents of sexual misconduct, whether discussed in your assignments or in person, to the Office of Equity, which can provide information about resources and options. We encourage students who have experienced sexual misconduct to talk with someone to get support. For more information, including how to request interim protective measures and academic accommodations or file a complaint, see the [Get Help page](#).

Other Resources

Students can find useful resources for safety and security, academic support, and mental and physical health and well-being at the [NUhelp website](#).