

# Smart Grid

## PA573 THE SMART GRID AND SUSTAINABLE COMMUNITIES

Spring 2026 — March 31 – June 9, 2026 (Tuesdays, 5:30–8:00 PM)

Last modified: 22 02 2026

Dropbox [link](#) to this document

Link to [Weekly Schedule \(Subject to Change\)](#)

## Background

This course looks at how the electric grid is changing in the 21st century. In the past, electricity mostly came from large power plants and was delivered through a centralized system run by utility companies or public agencies. Today, that system is being reshaped by new technologies. More people are installing solar panels and battery storage, wind power is expanding, and smart home devices—like voice-controlled thermostats and appliances—can now automatically adjust how and when they use electricity.

This course is taught by experts from both universities and the private sector. It prepares students for careers related to modernizing the electric grid, including roles like utility planner, community advocates, project developer, engineers, program managers, and policy analysts.

Students will mainly work on a team project and give presentations. Each week features an industry topic which will be led by an expert in the field or a guest speakers from industry and government, and there may be optional field trips.

## Course Information

### Schedule

- **Dates:** March 31 – June 9
- **Time:** Tuesdays, 5:30PM–8PM PST
- **CRN:** 64374

### Location

- **In Person:** RRRR ###
- **Online:** Zoom (link below)

### Instructors

#### Course Instructor

Angela Long

e. [angela.long@rockcressconsulting.com](mailto:angela.long@rockcressconsulting.com)

m. 503.502.3557

## Professional Development Coordinator

TBD

### Office Hours

Tuesdays, 4:00–6:00 PM (before class) and by appointment

Office hours are held in person and via Zoom (note: a separate Zoom link from the regular class session). If joining virtually, please wait in the Zoom waiting room until I finish with the previous student.

### Communication Guidelines

- The best way to reach me is by email or text.
- I respond within one business day.
- Please include “PA 573” in the subject line of your email.
- Please do not use the Canvas email system.

### Course Format

The course is taught live in person and simultaneously via Zoom. This flexible format supports students who live outside Portland or expect to travel during the spring term.

### Remote Participation Options

Graduate students and mid-career professionals may participate in one of two ways:

#### *1. Live Streaming*

Attend class in real time via Zoom. Participants can ask questions and join discussions using chat and other interactive features.

#### *2. Media Archive*

Each class session and presentation is recorded and available for viewing the following day. A link to the recording will be provided.

### Joining Remotely

Zoom Meeting Link:

- <https://pdx.zoom.us/j/81248972293>
- Meeting ID: 812 4897 2293

Phone Access (If Joining by Telephone)

- Dial (Portland): +1 971 247 1195
- Dial (Denver): +1 720 928 9299
- Enter Meeting ID: 852 1784 5248
- Telephone Commands
  - \*6 – Mute/Unmute

- \*9 – Raise Hand
- iPhone one tap mobile
  - +19712471195,,84520543408# US (Portland)
  - +17209289299,,84520543408# US (Denver)

#### Add to Your Calendar

You may download and import the **iCalendar (.ics) file** into your calendar system.

## Course Competencies

PSU's Department of Public Administration has developed a list of "key competencies" that students are expected to develop through their various course and experiences at PSU. The following key competencies are supported by this course.

Conceptualize, analyze, and develop creative and collaborative solutions to challenges in public policy, leadership and management.

Assess challenges and explore solutions to advance cross-sectoral and inter-jurisdictional cooperation in public programs and services.

Demonstrate verbal and written communication skills as a professional and through interpersonal interactions in groups and in society.

Think critically and self-reflectively about emerging issues concerning public service management and policy.

## Expectations, Logistics, and Course Policies

### Remote Learning Practices

The course will be delivered synchronously meaning that we will be interacting in real-time! We are all getting used to online learning, so expect errors and be generous and empathetic to yourself and others in the class.

- Interactive video conferencing is an art, not a skill! Feel free to ask questions via audio when you have them. However, the timing of asking is the art-part:
  - Wait for the speaker to pause, or until you think they are about to pause, before inserting your question. (Also make sure your audio is unmuted).
  - Listen for others speaking and yield the mic when in doubt. Talking over others and interjecting repeatedly makes for a less successful session.
- We will be using the interactive tools that are built-in to Zoom.
  - One set of tools is nonverbal feedback in the participants button at the bottom: click on that and there are icons for what you are feeling: Raise hand, away, need a break, go slower, faster, yes, no.
- We will be dividing into smaller groups for a discussion using Zoom's Breakout Room feature to assign students into groups for a short period of time so you may discuss things together.

- We will be recording the Zoom sessions for later review and integration
  - Because the sessions will be recorded, and I don't know what all gets recorded, be careful about what you write in the chat and say in the chat rooms.
  - Do not communicate personal information that you don't want others to see!! Technical Issues
- Everybody should remember to breathe deeply at all times. We are going to make this work the best we can and beyond that not worry about it.
  - Please use my office hours to schedule a time to meet with me to let me know how the course is going for you
- Join 10 minutes early the first session to get tech issues ironed out.
- If the Zoom meeting fails, look for an email from me on next steps
- If your internet bandwidth is limited, call in to Zoom on the 877#, and use the computer for video.
  - If the audio keeps breaking up, then turn off the video and let me know via that chat function the audio quality was bad.
- If you don't have internet access at home check this out National Digital Inclusion Alliance's (NDIA's) [Low-Cost Plan Model](#).

Two student computer labs will remain open during spring term — with proper health practices in place — in the first floor of Millar Library and in the basement of Fariborz Maseeh Hall.
- OIT may have laptops available to check out for students who may need them, which can be found at PSU's [Laptops & Equipment page](#).
- OIT has the [Virtual Computer Lab \(VLAB\)](#) service for students. VLAB lets students remotely access a selection of academic software applications from their personal computers, which can make it easier for students to complete coursework by removing some physical and financial barriers. To learn more, visit the VLAB help article. Please be patient as OIT works out the kinks.
- **Bring-your-own-device (BYOD):** We are attempting to make this course paper-free, and as such, we will view materials electronically during class. If you need additional time to view these materials, then you will need to bring an electronic device that is suitable for viewing documents and PDFs.
- **Cell phones and laptops:** Please make sure that your cell phone ringer is turned off. If you have an emergency call during class, please be sure to make it outside the classroom. Laptops are viewed as a privilege and can be used for taking notes, but students are not to use laptops or cell phones for extra-curricular activities during class.
  - Please do not surf the web or answer emails during class;
    - Students doing so will be penalized in their course participation component.
- **Pass/No-Pass:** Due to the new remote learning requirements, PSU is allowing students to temporarily take courses via [Pass/No Pass option](#). The Public Administration department allows grades of B- or better to qualify for Pass. Any Pass/No Pass courses will not count towards your GPA except for Covid allowances.
  - If you think you may use this grading option, I have a strong preference that you do it by week 3 at the latest.
- **Ethics:** Plagiarism is a no-no and is grounds for failing the class and expulsion from PSU.

- **For- credit students:** Cite all sources if you are paraphrasing, and use quotation marks if you are quoting. Scientific and Professional Ethics require that the work you do in this course must be your own. Feel free to build on, react to, criticize, and analyze the ideas of others but, when you do, make it known whose ideas you are working with. You must explicitly acknowledge when your work builds on someone else's ideas, including ideas of classmates, professors, and authors you read. If you ever have questions about drawing the line between others' work and your own, ask and I will give you guidance.
- **Course papers may be required to be submitted through Turnitin, a plagiarism software platform.**
- You can collaborate on the homework, but your submitted work should be your own. In many cases in the past, “joint” homework answers have been incorrect. If I suspect copying, I may give unannounced in-class quizzes to test for comprehension of the homework knowledge domains.
- **Late work.** Late work is accepted, but will result in penalties for tardiness of one full letter grade. This is done for equity reasons to level the playing field for those who manage to turn their work products in on time. Incompletes are not granted except in the case of hardship.
- **Attendance.** Graduate students are expected to attend all classes. Students who are unable to attend class must seek permission for an excused absence from me. Per Department policies, unapproved absences or late attendance may result in a lower grade for the course. If a student has to miss a class, s/he should arrange to get notes from a fellow student and is strongly encouraged to obtain the missed material.
  - If you observe a religious occasion on the same day as class, please let me know prior to the day of observance.
- Since the course modules will be recorded and available offline students who are not able to attend will be required to view the videos prior to the next week’s class.

## Evaluation: For-Credit Students

1. You are required to compose a group research paper that integrates the course learning objectives into an arena of your choosing (40%).
  - a. There will be a paper proposal handed out that will outline the research design and methods assignment
    - i. The proposal is a ~1 page document that discusses
      1. One paragraph background on why the topic is important
      2. What are 1-2 barriers for the technology, program or policy you are researching.
      3. What are the criteria that you will be using to evaluate the technology, program or policy? These may be efficiency (cost), effectiveness (penetration, energy savings, load shifting, etc), equity (how are different customer segments impacted), externalities (mitigating CO2, etc)
      4. Key research question(s) that will be addressed in the paper.

5. Analysis techniques you expect to use: levelized cost of energy comparisons, benefit-cost analysis, penetration simulations, SWOT analysis, etc.
  6. Types of data that will be collected and sources.
  7. Key audience (community partner, journal target, local government)
  - ii. More information on the research paper will be given out at a later date.
    1. Research ideas are in the spreadsheet which can be found [here](#).
    2. You can add your name to one of the Specific Project proposals or the more general research ideas listed below, which are still being formulated.
  - iii. Each member of the group will be graded on the quality of their own unique contribution to the paper. Each group member's effort on the paper will be graded by their peers.
    1. For those who for various reasons may prefer working on an individual paper, you may elect to do so and prepare your own paper as opposed to joining a group.
  - iv. You are expected to be able to write at the graduate level, including concise summaries of policy concepts and results. I may refer you to the PSU's [Writing Center](#) for additional support.
  - b. The final term paper guidelines are available here, and will also be posted to Canvas: <https://docs.google.com/document/d/1NbbgmgaVBLKgnf5KvBC61mcYHzEkbzFz/edit>
  - c. Students are expected to give a short presentation of their research topic the last week of class. This "mini-conference presentation" is a key learning outcome (15%)
2. Two homework assignments (25%)
- a. The first homework assignment is for you to prepare a half page (single spaced) with:
    - i. Your biographical information (see example)
    - ii. Your energy related career interests
    - iii. A fun fact about you
    - iv. Two or three smart grid technical or policy issues that you are interested in.

Give a 1-2 sentence description of each of your interests. Bonus points (not really) for including call outs to any active policy or program activity that you'd like to further development toward during this course or any community stakeholders you have connections to that would benefit from engaging with student teams in the course. The bio information goes in the Google Doc [here](#).
  - b. Energy analysis of smart grid topics (more information on a handout to be distributed later. Due in Word Doc format on CANVAS >Assignments> HW#1
3. Course participation consists of two elements weighted equally (20%). Both are due at 6:40 PM each week; one based on the current week's readings, and one based on the previous weeks speaker's comments.
- a. **Before Class Preparation (BCP):** This assignment is based on the upcoming week's readings and due on Canvas>Assignments at 6:40 pm on Monday night prior to each week's course session.

- b. **AFTER completing the week's readings**, carefully craft one question **for the speaker** that you develop on your experience and the reading material. The question can be a clarification of the material, an extension of the speaker's material, a linkage between the speaker's material and other course reading. It can also identify logical inconsistencies in the material, question the "conventional wisdom" or ask questions about evaluative criteria that the speaker did not cover (i.e., equity, externalities, effectiveness, efficiency, or empowerment). These questions will be shared on the discussion board as possible for the speaker Q&A.
- c. **After Class Discussion**: This assignment is based on the **previous week's speaker's comments** (and the associated readings for the previous week) and is for your fellow students and the co-instructors. It is due on Canvas>Assignments or Canvas>Discussions>Week# at 6:40 pm on Monday night after each week's course session.
  - i. The discussion question can be a follow on question from your BCP, something that sparked your interest from the class discussion, or it can be linking the previous week's readings to the upcoming week's readings.
  - ii. Please read the following blog on how to write engaging discussion questions: <https://www.eduflow.com/blog/how-to-write-discussion-questions-that-actually-spark-discussions>
- d. **NEW**: to better integrate student discussion questions, we are adopting student's suggestions from the mid-term survey. You need to read all the student After Class Discussion posts each week and reply to one. Replying a thread each week is now part of the participation element of the class.

## Evaluation: Professional Development (ProDev) Participants

- Professional development participants **MUST** complete the assignment to prepare a one paragraph bio on their history, interests, and future plans/desires. Here is the [link](#) to the Google Doc.
- ProDev Participants are strongly encouraged to join one of the research paper groups and offer their sage counsel to their peers.
- ProDev Participants are also encouraged to bring in relevant news articles / reports to share with the class.
- **NOTE**: If you take the class through the professional development option, you will not be able to retroactively have it count towards the Graduate Certificate in Energy Policy and Management. If you think you may want to pursue the certificate, I suggest that you enroll for the class as for-credit.

## Grading Scale

Your grade will be calculated using the following scale. Grades with plus or minus designations are at my discretion.

Letter Grade	Grade Point	Description	Learning Outcome	Letter Grade Range	Score Range
A	4.0	Complete mastery of course material and additional insight beyond course material	Insightful	A	93-100
				A-	90-92
B	3.0	Complete mastery of course material	Proficient	B+	87-89
				B	83-86
				B-	80-82
C	2.0	Gaps in mastery of course material; not at level expected by the program	Developing	C+	77-79
				C	73-76
				C-	70-72
U	0	Unsatisfactory	Ineffective	Let's Talk	<70

Grade Appeals: If you want to appeal a grade that you received on a work product, please submit a short written summary of your argument as well as relevant documentation. Grade change requests will not result in a lower grade being given.

## Required Course Readings

We will have a course text that we will follow along each week and pull some readings, but I've misplaced the online link. It will be a freely downloadable PDF. This will be updated by Friday 4/5/24 and I will send an email instructing on which sections to read / skim by Tuesdays course.

In addition to the course text, other required journal articles and book chapters will be posted on CANVAS and emailed to you each week.

- If something is missing please email me immediately: [angela.long@rockcressconsulting.com](mailto:angela.long@rockcressconsulting.com)
- Optimal readings are always being generated, and the volume is ever-growing. The syllabus may contain TBA (to be announced) when we have yet to find an optimal reading to exhibit the learning goals of the week. Thus, the syllabus should be considered a living document that will change over the course of the term. The most current version can always be found on CANVAS and you should consult it before doing the readings each week. Never fear: We will email you the final list of readings each week.
- The industry is full of horrible acronyms. Please see a handy cheat sheet [here](#). Recommended Readings

We reserve the right to distribute additional readings as the term progresses. We will usually bring some elements of the recommended readings into the class discussions, so some familiarity with them (i.e. quick scan) on your part will be beneficial to your learning environment.

Great information can be found on energy policy and management in the Northwest through the local industry newspaper, Clearing Up. You need to sign up in the Clearing Up tab Google Sheet with your name and PSU email [here](#).

## Important Due Dates

- **Bios on Google Drive:** 7 April (Pro-Dev Students)
- **HW#1:** 14 April on CANVAS
- **Draft Paper Proposals:** 5 May
- **HW#2:** 12 May on CANVAS
- **Paper Proposal Due:** 5 May at 6:40
- **Draft PPTs Due:** 16 May
- **Final Paper Due:** 7 June at 6:40
- **Student Research Presentations:** 9 June at 5:30PM in-class

## Potential Paper Topics

[Here](#) is a list of potential paper topics for the students to start self-selecting and forming teams.

## Weekly Schedule (Subject to Change)

Date	Week	Topic (Each session is recorded and placed in its Canvas>Module>Week# Folder)	Guest Speaker	Assignment Due
31 March	1	Course Overview & How the Grid Works	TBD	
7 April	2	Grid Fundamentals & Oregon Energy Policy	<ul style="list-style-type: none"> <li>• Edith Bayer, Oregon Department of Strategy</li> <li>• TBD - Jennifer Light, NWPCC</li> </ul>	<ul style="list-style-type: none"> <li>• Bios on Google Doc Due (Pro-Dev Students)</li> </ul>
14 April	3	Planning the Future Grid: Distribution & Resource Strategy	<ul style="list-style-type: none"> <li>• TBD - Darren Murtaugh, ICF</li> <li>• TBD - Jennifer Light, NWPCC</li> </ul>	<ul style="list-style-type: none"> <li>• HW#1 Due on Google Doc (Grad Students)</li> </ul>
21 April	4	Distributed Energy Resources & Flexible Loads	<ul style="list-style-type: none"> <li>• TBD - Seattle City Light, Karen Liu</li> <li>• TBD Brenda Hunt, NEEA</li> </ul>	
28 April	5	Energy Storage & Microgrids	<ul style="list-style-type: none"> <li>• Karina Hershberg, PAE</li> </ul>	
5 May	6	Virtual Power Plants & Aggregation Models	<ul style="list-style-type: none"> <li>• TBD - Franco Albi, PGE</li> <li>• TBD - Shawn Grant, PAC</li> </ul>	<ul style="list-style-type: none"> <li>• Draft Paper Proposal Due (Grad Students)</li> </ul>
12 May	7	Affordability, Equity & Energy Democracy	<ul style="list-style-type: none"> <li>• Jenn Latu, PGE</li> <li>• Brian Tyson, PSE</li> </ul>	<ul style="list-style-type: none"> <li>• HW#2 Due on CANVAS (Grad Students)</li> </ul>
19 May	8	AI, Data Centers & Load Growth	<ul style="list-style-type: none"> <li>• Dain Nestel, Escend Energy</li> <li>• Natalie Mims Frick</li> </ul>	
26 May	9	Grid & Local Resilience	<ul style="list-style-type: none"> <li>• Ryan Harvey, PAC</li> <li>• Alex Clingman, SNW</li> </ul>	<ul style="list-style-type: none"> <li>• Draft PPTs Due (Grad Students)</li> </ul>

Date	Week	Topic (Each session is recorded and placed in its Canvas>Module>Week# Folder)	Guest Speaker	Assignment Due
2 June	10	Cybersecurity & Grid Operations	• Dave Worth, Sage	
9 June	11	Smart Grid Public Forum <i>(student presentations)</i> Class will be held at its normal time during finals week.	• Students	<ul style="list-style-type: none"> <li>• Student research presentations</li> <li>• Final paper due</li> </ul>

## Course Modules & Assignments (SUBJECT TO CHANGE)

Note If there is a discrepancy between what is on the syllabus and what is on Canvas>Modules>Week#, please use THIS document as the master source.

### Week 1: Course Overview & How the Grid Works

#### Description

Introduction to the course, team formation, and overview of how the electric grid works—from generation to the meter. We will cover the basic architecture of the grid, key institutions (utilities, ISOs/RTOs, regulators), and the forces driving transformation: decarbonization, decentralization, digitization, and electrification.

#### Required Readings

- TBD

#### Supplemental Readings

- None

### Week 2: Grid Fundamentals & Oregon Energy Policy

#### Description

Deeper dive into wholesale electricity markets, distribution system basics, and the regulatory landscape. We'll also introduce the Oregon Energy Strategy (released November 2025 under HB 3630), its five pathways, and the state's projected doubling of electricity demand by 2050.

#### Required Readings

- Lavin, L. (2024). Electric Grid and Markets 101. National Renewable Energy Laboratory (NREL). [Link](#)
- Miller, P. (2019). Energy 101. U.S. Department of Energy (U.S. DOE). [Link](#)
- Dunlap, L. (2020). Electricity 101: Terms & Definitions. Resources for the Future. [Link](#)
- Allen, C. (2023). Oregon's Power Grid 101. Citizens' Utility Board (CUB) of Oregon. [Link](#)

#### Supplemental Readings

- PEW Charitable Trust. (2025). Advanced Transmission Technologies Offer Relief for Strained Power Grid. [Link](#)

## Week 3: Planning the Future Grid: Distribution & Resource Strategy

### Description

How utilities plan for grid investments, forecast load, and integrate distributed resources into distribution system plans. We'll examine PGE's Distribution System Plan (Oregon's first, which Angela Long led at PGE), integrated resource planning (IRP), and the intersection of transmission and distribution planning.

### Required Readings

- Lawrence Berkeley National Laboratory (LBNL). (2024). State Distribution Planning Requirements. Folders [Oregon](#) & [Washington](#). [Link](#)
- Portland General Electric. (2025). Integrated Resource Plan Update. [Link](#)
- PacifiCorp. (2026). Integrated Resource Plan Update ([Link](#)) and Clean Energy Plan ([Link](#)).
- Idaho Power. (2025). Integrated Resource Plan. [Link](#)

### Supplemental Readings

- Massachusetts Institute of Technology (MIT). (2013). The Future of the Electric Grid. Pages 1-28. [Link](#)
- New York Department of Public Service. (2024). Grid of the Future Proceeding Overview. [Link](#)

## Week 4: Distributed Energy Resources & Flexible Loads

### Description

Survey of distributed energy resources (DERs) — rooftop solar, behind-the-meter storage, smart thermostats, heat pumps, EVs — and how they interact with the grid. We'll cover grid-interactive efficient buildings, demand response, flexible load management, and the role of building electrification in grid planning.

### Required Readings

- Office of Electricity in U.S. DOE. (2024). Sourcing Distributed Energy Resources for Distribution Grid Services. Pages 1-20. [Link](#)
- International Energy Agency (IEA). (2022). Unlocking the Potential of Distributed Energy Resources: Power Systems Opportunities and Best Practices. Pages 7-40. [Link](#)

### Supplemental Readings

- The Pew Charity Trust. (2025) Distributed Energy Resources Are Transforming the Electric Grid. [Link](#)
- Deloitte. (2024) Households Transforming The Grid: Distributed Energy Resources Are Key To Affordable Clean Power. [Link](#)
- American Council for an Energy-Efficient Economy (ACEEE). Distributed Energy Resources Website. Accessed on February 2025. [Link](#)
- ACEEE's Utility Business Models Website. Accessed on February 2025. [Link](#)

## Week 5: Energy Storage & Microgrids

### Description

Battery storage economics, technology trends (lithium iron phosphate, long-duration storage), and the role of storage in grid operations. Microgrid design, project planning, community resilience microgrids, and the multifamily use case. We'll examine how storage costs have fallen 3 times in three years and the push toward 8+ hour duration requirements.

### Required Readings

- TBD

### Supplemental Readings

- TBD

## Week 6: Affordability, Equity & Energy Democracy

### Description

Who pays for the energy transition, and who benefits? We'll examine rising utility rates, energy burden in frontline communities, community solar, rate design and equity, and models of energy democracy. Potential speakers include community organizations like Verde (Portland) or tribal energy leaders.

### Required Readings

- LBNL. (2025). Improving Transparency in Electric Distribution System Planning to Support Affordability. [Link](#)
- Huang, L., Nock, D., Cong, S., & Qiu, Y. L. (2023). Inequalities Across Cooling & Heating in Households: Energy Equity Gaps. *Energy Policy*. Volume 182. [Link](#)
- Baker, E., Carley, S., Castellanos, S., et al. (2023). Metrics for Decision-Making in Energy Justice. *Annual Review of Environment and Resources*. Volume 48. Pages 737–760. [Link](#)

### Supplemental Readings

- S Carley and DM Konisky. (2020). The Justice & Equity Implications of the Clean Energy Transition. *Nature Energy*. Pages 569-577. [Link](#)

## Week 7: Virtual Power Plants & Aggregation Models

How distributed resources are aggregated into virtual power plants (VPPs) that can provide grid services at scale. We'll cover FERC Order 2222, wholesale market participation for DER aggregations, commercial models, and the growing role of VPPs as alternatives to gas peaker plants. The DOE's 2025 Liftoff Report shows VPPs providing peak capacity 40–60% cheaper than peakers.

### Required Readings

- LBNL. (2024). Distributed Energy, Utility Scale: 30 Proven Strategies to Increase VPP Enrollment. [Link](#)
- LBNL. (2024). Insights into Scaling VPP. Pages 1-35. [Link](#)
- LBNL. (2024). VPP Profiles & Inventory. Pages 1-14, 29-43. [Link](#)
- EnergyHub. (2025). Building Trustworthy VPPs: The VPP Maturity Model. [Link](#)

- Rocky Mountain Institute (RMI). (2024). VP3 Flipbook. [Link](#)
- U.S. DOE. Liftoff Report 2025 Update. [Link](#)

#### Supplemental Readings

- UtilityDive. (2025). VPP Convergence Project aims to Educate States on VPP. [Link](#)

### Week 8: AI, Data Centers & Load Growth

#### Description

The surge in data center construction and AI computing is reshaping grid planning nationwide. U.S. data center demand is projected to reach 6% of total electricity consumption in 2026. We'll examine load forecasting challenges, PJM's capacity price spike, equity concerns about who pays for grid expansion, and the potential for AI tools to improve grid operations and planning.

#### Required Readings

- Nicolas Institute for Energy, Environment & Sustainability at Duke University. (2025). Rethinking Load Growth: Assessing the Potential for Integration of Large Flexible Loads in US Power Systems. Pages 1-14. [Link](#)
- ACEEE. (2024), Turning Data Centers into Grid and Regional Assets: Considerations and Recommendations for the Federal Government, State Policymakers, and Utility Regulators. [Link](#)

#### Supplemental Readings

- TBD

### Week 9: Grid & Local Resilience

#### Description

Wildfire risk management, climate adaptation, public safety power shutoffs, and utility system hardening. We'll also examine community-scale resilience: tribal energy sovereignty projects (e.g., Confederated Tribes of Warm Springs' \$250M transmission upgrade with PGE), rural microgrids, and Oregon's resilience pathway in the Energy Strategy.

#### Required Readings

- TBD

#### Supplemental Readings

- B Stone Jr., C J. Gronlund, E Mallen, D Hondula, et al (2023). How Blackouts During Heat Waves Amplify Mortality and Morbidity Risk. Environmental Science & Technology. Volume 57, Issue 22. [Link](#)
- National Association of Regulatory Utility Commissioners (NARUC). (2020). Advancing Electric System Resilience with DERs: Key Questions and Resources. [Link](#)

### Week 10 Cybersecurity & Grid Operations

As the grid becomes more digitized and distributed, cybersecurity risks multiply. We'll cover threats to DERs and operational technology (OT) systems, federal cybersecurity standards (NERC CIP), the role of AI

in both attack and defense, and grid-enhancing technologies (GETs) for transmission system modernization.

### Required Readings

- TBD

### Supplemental Readings

- TBD

## Week 11: Smart Grid Public Forum

Student team presentations and Smart Grid Public Forum. Class will be held at its normal time during finals week.

**Due:** Draft PPTs for review — 6 June (Friday) at 6:40 PM

**Due:** Final paper — 6 June (Friday) at 6:40 PM

**Due:** All class assignments — 9 June at 6:40 PM

## ADDITIONAL COURSE POLICIES

Accommodations for Students with Disabilities: PSU values diversity and inclusion; we are committed to fostering mutual respect and full participation for all students. My goal is to create a learning environment that is equitable, useable, inclusive, and welcoming. If any aspects of instruction or course design result in barriers to your inclusion or learning, please notify me. The Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment. If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC is located in 116 Smith Memorial Student Union, 503-725-4150, [drc@pdx.edu](mailto:drc@pdx.edu) or <https://www.pdx.edu/drc>.

- If you already have accommodations, please contact me to make sure that I have received a faculty notification letter and discuss your accommodations.
- Please be aware that the accessible tables or chairs in the room should remain available for students who find that standard classroom seating is not useable.
- Mental Health Resources: Graduate school is a context where mental health struggles can be exacerbated. If you find yourself struggling, please ask for help. If you wish to seek out campus resources, here is some basic information about mental health resources at PSU: <https://www.pdx.edu/shac/counseling>.

**Title IX Discrimination and Harassment Policy:** As an instructor, one of my responsibilities is to help create a safe learning environment for my students and for the campus as a whole. We expect a culture of professionalism and mutual respect in our department and class. You may report any incident of discrimination or discriminatory harassment, including sexual harassment, to either the Office of Equity and Compliance or the Office of the Dean of Student Life.

- Please be aware that as a faculty member, I have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If you would rather share information about sexual harassment or sexual violence to a confidential employee who does not have this reporting responsibility, you can find a list of those individuals. For more information about Title IX, please complete the required student module Creating a Safe Campus in your CANVAS.