

PA 573

Smart Grid and Sustainable Communities

Last Modified 2 March 2020

Official (Old) Course Description

The course provides students with a basic understanding of Smart Grid technology, including grid modernization, internet of things (IoT) and the conditions that need to be in place for its success as a policy & planning tool for reducing CO2 emissions and adding sustainability and resilience to communities. Students will be provided with the historical development of the technology and its current status from the standpoint of policy and planning implementation.

Background

This course analyzes the issues surrounding the “modernization” of the electricity grid in the early 21st century. The old utility business model with a centralized grid run by regulated utilities or public power agencies has been inundated by a wave of technological breakthroughs, including plummeting solar panel and energy storage costs, proliferation of wind turbines, and continual development of cheap voice-activated electronic communication tools to enable smart domestic appliances and heating and cooling equipment to follow commands of the owner. With a host of disruptive business innovators, and demands for real-time electricity pricing that is more reflective of actual costs, the pace of grid modernization continues increase.

This interdisciplinary course is co-taught by a team of academic and private sector specialists to prepare students to contribute to grid modernization as project developers, engineers, program managers, policy analysts, and other key positions. Coursework focuses on a team project and presentations with weekly guest speakers from industry and policy and may include optional field trips.

Course Information

Time: **Tuesdays 6:40-9:20** Begins **March 31 through June 9th**
Room: **TBD**
CRN: **64683**

Instructors

1. Hal T. Nelson, Ph.D., CFA
Associate Professor
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Teaching Assistant
TBD

**Technology Specialist/
Professional Development Coordinator**
Sandra De Jesus Vielmas
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Office Location: URBN 670C. Call my office line if you are locked out of the main door
Nelson's Office Hours: Tuesdays 4:00-5:30 & by appointment (preferred)
The best way to get in touch with me is via email. I will endeavor to respond to email/voice messages within 1+/-1 business day

D2L Course website is: TBD

The course is taught live in the classroom as well as via distance learning, which provides several ways for students who live away from Portland or who expect to travel during the Spring the participate. **Two Distance Learning** options are available for interested graduate students and mid-career professionals:

- **Live Streaming.** Participants can stream the class live on their computers. They can ask questions as well as participate in discussions with the help of chat or similar options.
- **Media Archive.** Each class and presentation will be captured and stored for later viewing on your computer. A link will be provided for access to the archived media, which should be available the next day.

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.

1. Conceptualize, analyze, and develop creative and collaborative solutions to challenge in public policy, leadership and management.
2. Assess challenges and explore solutions to advance cross-sectoral and inter-jurisdictional cooperation in public programs and services.
3. Demonstrate verbal and written communication skills as a professional and through interpersonal interactions in groups and in society.
4. Think critically and self-reflectively about emerging issues concerning public service management and policy.

Expectations, Logistics, and Course Policies

- **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.
- **Ethics: Plagiarism is a no-no and is grounds for failing the class and expulsion from PSU.**
 1. For- credit students must take the quiz located here:
<http://cw.routledge.com/textbooks/bailey/questions.asp?unit=1>
You must take the quiz the first week of courses.
Upload a PDF of your quiz results to the Activities>Assignments folder here:
https://d2l.pdx.edu/d2l/lms/Activities>Assignments/admin/mark/folder_submissions_users.d2l?db=156934&ou=636640
 - Everyone must score 18/25 or better to pass the quiz.
 - 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 or my teaching assistant. Unapproved absences or late attendance for two or more classes 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. 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 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 D2L.

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 (35%).
 - a. There will be a paper proposal handed out that will outline the research design and methods assignment (this is worth 1/5 of the research paper grade).
 - i. More information on the research paper and proposal will be given out at a later date.

- ii. 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. Working in a group is optional—you may prepare your own paper.
 - iii. 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 writing center: <http://www.pdx.edu/writing-center/>
 - b. 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. Take home quiz (30%)
 - 3. Finally, in-class participation is critical to the course learning environment (20%). Student evaluation of their participation is based on Instructor evaluation. Participation will be evaluated over the entire term.
- Class Participation evaluation criteria include the following:

Guidelines	
Clarity:	Answering the question with Unambiguous claims (arguments), that are backed with evidence from the readings
Professionalism:	Your writing will reflect “good communication, organized thought, a high standard of grammar and language, clarity and conciseness” (Wikipedia: Professional Writing)
Technical Skill:	Superior responses will demonstrate an understanding of the technical components of energy and environmental policy
Overall:	The best responses will compare and contrast assumptions, methodologies, and/or findings of the course readings or relevant outside readings.

- For full credit, students must also keep their class input “on-target” and relevant to the course materials.

Evaluation: Professional Development Participants

- Professional development participants MUST complete the assignment to prepare a one paragraph bio on their history, interests, and future plans/desires.
 - Participants are strongly encouraged to join one of the research paper groups and offer their sage counsel to their peers.
 - 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
A	4.0	Complete mastery of course material and additional insight beyond course material	Insightful
B	3.0	Complete mastery of course material	Proficient
C	2.0	Gaps in mastery of course material; not at level expected by the program	Developing
U	0	Unsatisfactory	Ineffective

Grading Details

Letter Grade	Range	Letter Grade	Range
A	93-100	C+	77-79
A-	90-92	C	73-76
B+	87-89	C-	70-72
B	83-86	Let's talk	<70
B-	80-82		

- **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

All students are **required** to buy the following book:

- Sioshansi, F. P. (Ed.). (2016). *Future of utilities-utilities of the future: how technological innovations in distributed energy resources will reshape the electric power sector*. Academic Press.

If you buy it online, be sure to get expedited shipping as we will be using it immediately. Handouts from other book chapters will be given for the reading assignments. Additional readings are in the Files folder.

In addition to the course text, **other required** journal articles and book chapters will be posted on D2L.

- If something is missing please email Prof. Nelson immediately.
- Optimal readings are always coming across our desks. 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 D2L and you should consult it before doing the readings each week.*

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.

Important Dates

- Take home quiz: **TBD May**
- Final paper due: **TBD June at 6:40**
 - Paper Proposal Due: **1st week of May at 6:40**
 - Student research presentations: **9 June at 6:40 pm in-class**

Course Modules, Guest Speakers, & Reading Assignments:

Date	Topic	Guest Speaker	Readings
31 Mar	Class Overview, Teams, Projects – Grid 101 (part 1)	Osborn	TBD
7 April	Grid 101 (part 2) – Electric Power Fundamentals Climate Change Grid Outages: New Normal?	Osborn TBD	TBD
14 April	Energy Policy Issues – Pacific Northwest and US	Jeff Hammarlund Confirmed	TBD
21 April	Internet of Things and California Transactive Energy Pilot	Michel Kohanim Confirmed	TBD
28 April	Demand Response Technology & Results	Scott Reeves – Cadmus Confirmed	TBD
5 May	Solar Technology and Net Metering Policy Solar Communications & Standards	Suzanne Leta James Mater Confirmed	TBD
12 May	Solar + Storage + Microgrids for Communities Internet / Grid Security Issues	Kevin Whitener	TBD

		Confirmed	
19 May	Transmission – State Estimation, Stability & Synchrophasor Applications	BPA TBD	TBD
26 May	California trends, Distribution System Operations & Planning. EV Charging Networks in the US	Paul DeMartini Invited	TBD
2 June	Emerging Grid technologies (OMS, DMS, DERMS, Transactive Energy)	Josh Keeling Invited	TBD
9 June	Smart Grid Public Forum		

Final Team Paper Due on Assignments in Final Paper Folder (6:40)

Team Evaluations Due on Activities>Assignments in Team Evaluation Folder (6:40)

All Materials for Class Due (6:40)