

ECE 437/537 - Smart Grid

Catalog Description: Fundamentals of smart power grids. Technology advances in transmission and distribution systems. Policy drivers. Assets and demand management. Smart grid security.

Credits: 3 **Terms Offered:** Spring

Prerequisites: ECE 433/533

Corequisites: None

Courses that require this as a prerequisite: None

Structure: Three 50-minute lectures per week.

Instructors: Eduardo Cotilla-Sanchez

Course content:

- Introduction to smart power grids. Technology and policy background.
- Smart generation. Energy storage. Microgrids.
- Substation intelligence.
- Transmission systems. Phasor measurement units.
- Distribution systems.
- Smart grid monitoring and communications.
- Asset management. Consumer demand management.
- Smart meters and advanced metering infrastructure.
- High performance computing applications for smart grid.
- Smart grid security.

Measurable Student Learning Outcomes:

Upon completing this course, students will be able to...

1. **Describe** the paradigm shift between traditional power transmission and distribution and smart power grids verbally and in writing. (A, C, E, H, J, m)
2. **Analyze** drivers, challenges and benefits to the integration of renewable and distributed generation into large power grids. (A, C, E, H, J, l, m)
3. **Describe** and assess smart grid technologies that enhance transmission and distribution systems. (A, C, E, H, J, l, m)
4. **Write** about current implementations of smart grid technologies and/or policies using regional data sources. (A, C, D, g, h, J, m)
5. **Work** effectively in project teams using appropriate communication skills in order to present information about smart grid industry practices and community engagement. (D, G)
6. ECE 537: Summarize a literature review in the assigned topic and analyze the data with the rigor of a research paper. (H, J)

Learning Resources:

- Class lecture notes
- Borlase, "Smart Grids: Infrastructure, Technology and Solutions", 1st ed., 2012 (required).

Students with Disabilities:

Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

Link to Statement of Expectations for Student Conduct:

<http://oregonstate.edu/admin/stucon/achon.htm>

Remarks:

Students are required to use a document preparation system (such as LATEX) for assignments. Students are required to visit office hours at least once per term. Graduate students will receive additional questions during assignments and a different, more exhaustive grading rubric.

Revised: 7-11-13