



EE 451/EE 551

Wind Energy

TW, 4:30pm-6:20pm, MOR 225

Instructor: Baosen Zhang

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Office Hours: Fridays 4-5pm

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**Course Description:** Upon completing this course, the student should be able to:

- Explain what how is electrical power obtained from wind
- Perform basic calculations for wind power based on wind turbine characteristics and terrain
- Explain what are the main considerations for wind power integration
- Develop basic operating planning tools to accommodate wind power in power grids
- Discuss the main methods used to allocate recourse to accommodate wind power uncertainty and variability
- Solve optimization problems using commercial packages

**Prerequisite(s):** This class requires EE 351. We also assume that you know basic linear algebra (solving small linear systems), calculus (multivariate differentiation) and classical mechanics. Some knowledge of probability is helpful, but not necessary.

**Text(s):** The following textbook is required for this class:

- “Wind Energy: An Introduction”, by Mohamed A. El-Sharkawi

**Exams and Assignments:**

1. Homework Assignments: Weekly homework assignments
2. Midterm: in class, date TBA
3. Final: Friday, March 16, 2018, 4:30-6:20pm, MOR 225

**Grade Distribution:**

1. Homework, 30%
2. Midterm, 30%
3. Final, 40%

**Notes:** This class is cross-listed and contains both graduate and undergraduate students. Both types of students will complete the same homework assignments and exams. However, if grade adjustment becomes necessary, we will do so after the final exam.

**Software:** We will solve some small optimization problems in this class. We assume you have Matlab with the optimization package installed (you should be able to use the “linprog” command). You can use other optimization tools if you like, but all examples and homework solutions will be given in terms of Matlab code.

**Website:** The main website is <http://zhangbaosen.github.io/teaching/EE451>. We use the Canvas website for grading and homework submissions.

### Tentative Course Outline:

The weekly coverage might change depending on the progress of the class.

Week	Content
Week 1	• Introduction to power systems with wind energy
Week 2	• Aerodynamics of Wind Turbines
Week 3	• Wind Statistics
Week 4	• Overview of Wind Turbines
Week 5	• Induction Generator
Week 6	• Synchronous Generator
Week 7	• Introduction to Power System Operation
Week 8	• Economic Dispatch
Week 9	• Energy Storage
Week 10	• Unit Commitment
Week 11	• Unit Commitment with Recourse

### Course Policies:

- **No late homework assignments will be accepted!**

- **Academic Honesty Policy Summary:**

All students are expected to follow the student conduct code at

<http://www.washington.edu/admin/rules/policies/WAC/478-121-107.html>.

Every member of the class is expected to conform to the highest standards of academic integrity. **Offering** and **accepting** solutions from others is an act of **cheating**, which is a serious offense and **all involved parties will be penalized according to the student conduct code**. Discussion about homework assignments are encouraged, but anything you hand in must be your own work. If you use any results from published literature, you must cite it clearly. Violation of the conduct code can lead to failure of the course and possibly expulsion from the University. Not knowing the policy is not an excuse for cheating.