

# **MEEG 435/667 Wind Power Engineering**

(3 credits) Spring Semester 2008

Prof. Len Schwartz    SPL 309    Office Hours TR 5-6

PRS 311    TR 3:30 - 4:45

Required Text: J. F. Manwell, J. G. McGowen, A. L. Rogers, "Wind Energy Explained," Wiley, 2002.

## **Syllabus:**

1. Wind role in world energy requirements; Clean energy. The wind resource.
2. Historical overview; horizontal vs. vertical axis machines; modern "Danish" wind turbine.
3. Mass, momentum and energy balances; actuator-disk theory; Betz limit. Dimensional analysis and scaling.
4. Wind turbine aerodynamics; airfoil theory, elementary and corrected blade-element theories.
5. The numerical prediction of wind power performance. Available numerical models. NREL and RERL.
6. Dynamics, structural, control, and electrical aspects.
7. Grid integration and economics; environmental issues; energy storage.
8. Site visit to wind farm.
9. Possible visit to Gamesa assembly plant.

## **Additional References:**

1. R. Gasch & J. Tweele, "Wind Power Plants: Fundamentals, Design, Construction And Operation, Solarpraxis, 1999.
2. S. Heier, 'Grid Integration of Wind Energy Conversion Systems,' Wiley, 1998.
3. Al Gore, "An Inconvenient Truth," 2006.

## **Grading scheme:**

Homework & Computer Projects    25%

Paper and presentation:    25%

Take-home exams:    50%