WESEP 512. Wind Energy System Deployment

Laboratory Activities

WESEP 512 will include several hands-on experiences, which includes simulation, operation, and analysis of wind energy conversion systems. These activities are designed to complement and reinforce topics covered in the classroom. Some activities may have pre- or post-lab homework assignments.

Activity details can be found in the Wind Energy Systems Experimenter’s Handbook. The corresponding experiments are listed in parenthesis.

Lab activities will take place in the Wind Energy Systems Lab, located in 1101 Coover Hall. Observe all safety requirements associated with these activities, summarized in another document provided with these course materials.

**Week(s) Topic Activity**

3 Elect. Machines & Power Converters Pitch angle and torque due to wind (exp. 5.1)

6 Drivetrain Operation Hub imbalance by rotor bearing acceleration (exp. 7.1)

7 Sensing and Inspection Gearbox health from torque and acceleration (exp. 7.2)

12 Tower Structures & Construction Turbine Inspection and Tower load measurements (exp. 6.1)

In addition to the above activities, you are encouraged to use the tools and resources available in the lab for your course project.

**Resources:** **Project Ideas:**

DC Power Supplies Buck Converter and synchronous generator control

Oscilloscopes Back-to-Back converter and DFIG control

Signal Analyzer Full-bridge converter and PMSG control

Signal Generator Pitch control system

Power Electronic Circuits Signal analysis for health monitoring

Microcontrollers Wind speed and direction measurement for siting study

Programmable Load Reactive Power and grid support capabilities

Blade loading analysis

Tower loading analysis

Gearbox vibration analysis

SCADA system with LabVIEW or MATLAB