ME51400 – Fundamentals of Wind Energy

Fall 2016

Course Syllabus

Objectives

This course introduces the technology and economics of converting wind energy to electricity and other kinds of energy. Both utility scale horizontal axis wind turbines and small scale horizontal & vertical axis wind turbines are addressed, as well as the economical and environmental issues associated wind energy. In particular, the course is developed for students to:

- Understand the effects of technology on society;
- Understand the fundamental principles of wind energy and wind turbine engineering;
- Apply the principles to practical engineering situations;
- Stimulate creative thinking; and
- Enhanced the ability to communicate technical information (in written and oral form).

Coverage Topics

- Overview of Renewable Energy
- Wind Energy Fundamentals: Technical and Business Aspects
- Actuator Disk Theory
- The Wind
- Wind Turbine and Wind Farm
- Wind Turbine Blades
- Blade Element Theory
- Wind-Powered Pumps
- Wind Energy Economics

Prerequisite

Undergraduate level fluid mechanics (ME309 or equivalent) and engineering mathematics

Meeting Time

Tuesday/Thursday 1:30-2:45am, ME 2004

Instructor

Prof. Jun Chen
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Teaching Assistant

Mr. Weixiao Shang
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Office Hour

Tuesday/Thursday 2:50-3:50am (or by appointment)

Textbooks*

- ***Wind Energy Explained: Theory, Design, and Application***, By James F. Manwell, Jon G. McGowan, and Anthony L. Rogers, Wiley; 2 edition (February 2010)
- ***Wind Power Plants: Fundamentals, Design, Construction and Operation,*** Gasch, Robert, Twele, Jochen (Eds.) Springer-Verlag Berlin Heidelberg; 2 edition (2012)

General Policy

- Attendance: class attendance is required.
- Homework: homework will be assigned periodically with due date assigned.
- Exams: one mid-term and one final exam will be scheduled.
  - Both exams will be given in class, close book/notes.
  - One page cheat sheet is allowed: letter size paper (both sides okay).
- Project: every student needs finish project with one or two partners as a group. The group can select a project topic related to wind energy. It can be an exploration of a new concept/application, a review of research paper(s), or development of design/analysis software.
  - The project topic is due on 09/22/2016 for approval.
  - Before the final deadline, each group should turn in a project by following a given format requirement and prepare a 10-minute in-class presentation. The details about the presentation will be announced separately.
  - The contribution of every team member must be identified explicitly in the report.
- Group discussion on course materials is permitted, but each student must finish homework and exams INDEPENDENTLY and NO TEAMWORK is allowed. Violations will subject to academic sanctions.
- **Cell Phone Policy**: The use of cell phones, smart phones, or other mobile communication devices, and visiting social medias during class are disruptive. Therefore ***they are prohibited during class***. Except in emergencies, those using such devices must leave the classroom.

Grade Policy

- Homework: 25%
- Midterm (25%) and final exam (25%)
- Project: 25%
- Letter grade (+/-)
- Grades may be curved according to instructors' discretion

Important Dates

- Sep. 22, 2016: project topic due
- Oct. 11, 2016: Fall Break (No Class)
- Oct. 13, 2016: midterm exam
- Nov. 24, 2016: Thanksgiving Break (No Class)

- Dec. 6, 2016: final exam
- Dec. 8, 2016: project preparation (No Class)
- 5pm, Dec. 12, 2016: final project report due
- Dec 12-17, 2016: project presentation (TBD)

EMERGENCY PREPAREDNESS – A MESSAGE FROM PURDUE

To report an emergency, call 911. To obtain updates regarding an ongoing emergency, sign up for Purdue Alert text messages, view www.purdue.edu/ea.

There are nearly 300 Emergency Telephones outdoors across campus and in parking garages that connect directly to the PUPD. If you feel threatened or need help, push the button and you will be connected immediately.

If we hear a fire alarm during class we will immediately suspend class, evacuate the building, and proceed outdoors. Do not use the elevator.

If we are notified during class of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in [the basement].

If we are notified during class of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in the classroom, shutting the door and turning off the lights.

Please review the Emergency Preparedness website for additional information.

http://www.purdue.edu/ehps/emergency_preparedness/index.html