

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 488 Wind Energy Engineering (4) Elective

Course Description: (2007-09 Catalog) Engineering aspects of windpower systems including aerodynamic analysis, wind field analysis, system concepts analysis, mechanical design, wind turbine siting, system design and integration, environmental aspects, wind energy simulation, and economics.

Prerequisite Courses: ME 329, ME 347, ME 302

Prerequisites by Topic: Design, Fluid Mechanics, Thermal Engineering

Textbook: (and/or other required material) Wind Energy Explained: Theory, Design and Application, 2nd ed., by J. F. Manwell, J. G. McGowan, A. L. Rogers, Wiley, 2009

References: Wind Turbines: Fundamentals, Technologies, Application, Economics, 3rd ed., by E. Hau, Springer, 2013

Course Coordinator/Instructor: P. Lemieux, Professor of Mechanical Engineering

- Course Learning Outcomes:**
1. Evaluate the suitability of a given turbine design for a specific site and application.
 2. Evaluate the performance of an existing wind turbine planform.
 3. Design various wind turbine subsystem components in accordance to international standards.
 4. Understand the constraints, opportunities and challenges of global energy production, and the contribution of wind energy in the global make up of human energy needs.
 5. Develop the tools necessary for the successful design, development and analysis of wind turbine components and systems.
 6. Investigate the aerodynamic, mechanical, electrical, and economic aspects of wind engineering.
 7. Analyze existing wind turbine design from the engineering and economic standpoints
 8. Appreciate the design philosophy guiding modern wind turbine development.

Relationship of Course to MECHANICAL ENGINEERING Program Outcomes:												
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>
H	N	M	N	H	L	M	M	M	L	H	H	H

Topics Covered:

1. Historical overview of wind power
2. Developments leading to present technology
3. Statistical analysis of wind field data
4. Aerodynamic analysis of turbine blades and rotor performance analysis
5. Mechanical design of wind turbine components
6. On-shore and off-shore wind farms

Laboratory Projects:

None formally; site visit and analysis of data of Cal Poly Wind Turbine Facility.

Class/Lab Schedule:

Four 50-minute lectures per week.

Contribution of Course to Meeting the Professional Component:

- (a) College-level mathematics and basic sciences: 0 credits
- (b) Engineering Topics: 3 credits
Design? Yes, 1 credit
- (c) General Education: 0 credits
- (d) Other: 0 credits

Prepared by: P. Lemieux

Date: 05/14/14
