

CIVE 506 Wind Effects on Structures–Spring 2009 (MWF, 8-8:50, B105, Eng. Bdg.)

Course description: Analysis of wind effects on buildings and structures; deterministic and statistical methods; aerodynamic loading and response; codes and standards.

Instructor: Bogusz Bienkiewicz, A207B Engineering Building (A125 Engineering Research Center), 491-2026 (491-8232).

Textbooks (optional) : Simiu, E. and R. H. Scanlan, *Wind Effects on Structures*, John Wiley & Sons, Inc., Simiu, E. and T. Miyata, *Design of Buildings and Bridges for Wind*, John Wiley & Sons, Inc.

Course Objectives: The course is designed for students interested in wind effects on buildings and structures, and wind-resistant structural engineering analysis and design. The students will learn principles of deterministic and statistical evaluation of wind loading and wind-induced response of buildings and structures, and techniques for assessment of related impacts, e.g. wind environment at pedestrian level, comfort of occupants of buildings and structures. Development of countermeasures to mitigate undesired wind effects will be discussed.

Successful students will accomplish the following in this course:

- Gain an understanding of the fundamental concepts of bluff-body aerodynamics, in context of wind effects on buildings and other wind-prone structures.
- Learn to identify physical phenomena underpinning specific wind effects leading to critical wind loading for buildings and other specific structures.
- Learn fundamental theory and practice of deterministic and statistical dynamic analysis of wind loading, wind-induced response and other related wind effects.
- Learn techniques for wind-resistant design utilizing wind provisions of codes and standards and other approaches applicable for specific structures.
- Gain broader understanding of risk assessment and performance-based design for wind.
- Learn fundamentals of wind energy and design/assessments of wind turbines.

Course Topics/Weekly Schedule:

Week	Topics
1	Introduction/overview of wind environment and effects
2	Fundamentals of deterministic vibrations
3	Introduction to random vibrations
4	Analysis and modeling of dynamic response and risk assessment
5	Aerodynamic loading and response
6	Aeroelastic effects and countermeasures
7	“Standard” structures and design codes for wind loading/response
8	Tall buildings
9	Towers and stacks
10	Long-span bridges
11	Other wind-sensitive structures
12	Human perception of wind-induced response and pedestrian comfort
13	Introduction to wind power
14	Wind turbines
15	Other special topic(s)

Methods of Evaluation: Periodic homework problem sets will be assigned. Special design or paper review project will be assigned. Students will make a brief oral presentation on this assignment. Two equally weighted exams and a final exam will be given. The course grade will be based on the following distribution: Homework problems - 20%; Exam I - 20%; Exam II - 20%; Design/review paper/project - 10%; Final exam (comprehensive) - 30%.