

**CIVIL ENGINEERING DEPARTMENT
COLORADO STATE UNIVERSITY
FORT COLLINS, COLORADO**

**CE504
WIND ENGINEERING
FALL 2006
(Rev. 8-18-06)**

- I. LECTURES:** 10:00 - 10:50 a.m. MWF, Rm. B101 NESB
- II. TEXT:** Simiu, E. and T. Miyata, "Design of Buildings and Bridges for Wind", John Wiley & Sons, Inc., 2006 (optional)
- III. INSTRUCTOR:** B. Bienkiewicz, Prof. & Dir.
Wind Engineering and Fluids Laboratory
(www.windlab.colostate.edu)
Office: Rm A207B Eng.Bldg., Ph. 491-2026
(Eng. Res. Ctr., Ph. 491-8232)
- IV. PROBLEM ASSIGNMENTS:** Problem sets will be assigned, collected and graded.
- V. GRADING:**
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|----------------------------|------|
| Homework Problems | 20% |
| Test 1 | 20% |
| Test 2 | 20% |
| Review Paper | 5% |
| Final Exam (comprehensive) | 35% |
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| TOTAL | 100% |

CE 504, WIND ENGINEERING, FALL 2006 (Rev. 8-18-06)
TENTATIVE OUTLINE

WEEK	TOPIC
1	INTRODUCTION Wind Engineering - Overview Atmosphere/U.S. Standard Atmosphere Wind, Lapse & Stability
2	GLOBAL CIRCULATION & EFFECTS OF EARTH ROTATION Global Circulation and Wind Coriolis Effects Cyclonic/Anticyclonic Circulation
3	EFFECTS OF FRICTION Geostrophic Wind & Ekman Spiral Planetary/Atmospheric Boundary Layer Surface Shear Layer (SSL)
4	WIND CHARACTERISTICS AND SSL TURBULENCE Mean Wind and Turbulence Intensity Elements of Probability and Statistics for WE Wind Spectrum, Correlation and Scale
5	WIND-TUNNELS AND WIND MODELING Similitude Analysis Similarity Requirements for Modeling Atmospheric Flows Wind Tunnels and Experimental Techniques
6	EXTREME WINDS, RISK ANALYSIS Extreme/Order Statistics Extreme Wind Speed Analysis Risk and Safety Considerations
7	LOCAL AND GLOBAL WIND LOADING Wind Pressure and Aerodynamic Loading Local Cladding/Roof Pressure Global Wind Loading
8	IMPLEMENTATION OF CODES AND STANDARDS Provisions of ASCE 7 Standard Examples of Implementation of ASCE 7 Standard Other Codes/Standards, Limitations
9	STRUCTURAL DYNAMICS FOR WIND ENGINEERING Simplified Representation of Buildings and Structures Response of Mass-Spring-Damper System Random Loading and Structural Response
10	BLUFF-BODY AERODYNAMICS FOR STRUCTURES Flow Separation and Vortex Shedding Aerodynamic Instability: Galloping and Flutter Cross-Wind Response of Structures
11	WIND-TUNNEL MODELING OF AERODYNAMIC LOADING AND RESPONSE Local and Global Wind Loading Techniques for Aerodynamic Loading and Response Modeling of Aeroelastic Effects
12	ATMOSPHERIC ADVECTION AND DISPERSION Air Pollution Plume Rise Wind-Tunnel Modeling Techniques
13	WIND-INDUCED MASS TRANSPORT Snow and Sand Drifting Soil Erosion Liquid Evaporation
14	THANKSGIVING BREAK
15	WIND POWER AND CONTROL OF WINDS Wind Power Installations Wind Breaks Topographic Effects
16	SOCIETAL AND ECONOMIC EFFECTS Human Comfort Structural Response Control Economic Aspects and Insurance Industry Implications
	FINAL EXAM Thur., Dec. 14, 1:30p-3:30p.