

The Hong Kong University of Science and Technology

UG Course Syllabus

[Course Title] Introduction to Wind Effects on Buildings and Structures

[Course Code] CIVL 4380

[No. of Credits] 3

[Any pre-/co-requisites] Nil

Name: [Instructor(s) Name] Prof. Tim K.T. Tse

Email: [Your Email Address] timkttse@ust.hk

Office Hours: [Specify Office Hours and Location] 16:00 – 18:00 Tue & Thur, Rm 3568

Course Description

[Briefly describe the course content, key topics or themes, objectives, methods of instruction, e.g., lectures, discussions, projects].

The course covers 5 wind engineering topics.

Topic 1: Wind Environment

Global wind climate; wind climate in Hong Kong; design wind speed in Hong Kong; wind structures near ground

Topic 2: Wind Pressure and Forces on Buildings

Introduction to wind pressure; wind pressure on rectangular buildings; wind forces and moments.

Topic 3: Structural Dynamics

Formulation of equation of motion; undamped and damped free vibration; harmonic excitation; periodic excitation; random vibration; spectral analysis.

Topic 4: Wind Induced Vibration

Along-wind response of structures; cross-wind response of structures; interference excitation of tall buildings.

Topic 5: Wind Loading Codes

Code of Practice of Wind Effects in Hong Kong 2004 & 2019; Australian/New Zealand Standard, Structural Design Actions Part 2: Wind Actions 2002 & 2021.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Describe the characteristics of wind, wind structure near ground and topographical effects on wind;
2. Identify the factors that affect the structural design of a building against wind;

3. Analyze dynamic problem of buildings subject to different dynamic loads;
4. Determine the alongwind and crosswind forces of a structure and the wind-induced structural responses;
5. Perform a tall building design following Hong Kong and Australian wind codes;

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Homework Assignments	40%	~22 Sept/13 Oct/3 Nov/24 Nov 2026*
In-course essay	N/A	N/A
Group Project	N/A	N/A
Final examination	60%	7 – 29 Dec 2026

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

[add to/delete table as appropriate]

Assessed Task	Mapped ILOs	Explanation
Homework Assignments	ILO1, ILO2, ILO3, ILO4, ILO5	Assignments are given to assess student understanding of the topics during the learning process (ILO #I, II, III, IV, and V).
Final Exam	ILO1, ILO2, ILO3, ILO4, ILO5	Final examinations are conducted to assess student understanding of the topics (ILO #I, II, III, IV, and V).

Grading Rubrics

[Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.]

Criteria	Assignment 1 - Wind Environment	Assignment 2 - Wind Pressure & Forces	Assignment 3 - Wind Induced- vibration	Assignment 4 - Wind Loading Codes
Correct Use of Concepts & Formulas (20%)	Identifies and applies correct concepts and formulas for wind climate, design wind speed, terrain roughness, wind profiles, and topographical effects	Identifies and applies correct formulas for wind pressure, pressure coefficients, wind forces, moments, and building load distributions	Identifies and applies correct formulas for structural dynamics, natural frequency, damping, along-wind response, cross-wind response, and vibration effects	Identifies and applies correct procedures, coefficients, and formulas from the Hong Kong and Australian/New Zealand wind loading codes
Calculation Accuracy (45%)	Performs accurate calculations for design wind speed, wind profiles, terrain factors, and topographical effects; correct units	Performs accurate calculations for wind pressures, resultant forces, base shear, overturning moments, and load distributions; correct units	Performs accurate calculations for natural frequency, damping, dynamic response, along-wind and cross-wind forces; correct units	Performs accurate code-based calculations for design wind speed, pressure, forces, moments, and structural response; correct units
Problem Solving Process (20%)	Logical, step-by-step solutions for wind climate, terrain, wind profile, and design wind speed problems; all workings and units	Logical, organized steps for determining wind pressures, forces, moments, and critical loading cases; all workings and units	Logical, stepwise solutions for dynamic formulation and wind-induced response analysis; all workings and units	Logical, stepwise application of code provisions, factors, load cases, and design checks; all workings and units
Diagrams & Presentation (15%)	Neat, labelled wind profiles, terrain categories, and topographical sketches; organized and legible	Correct, labelled pressure distributions, free-body diagrams, force diagrams, and building sketches; organized and legible	Clear, labelled mode shapes, response spectra, vibration plots, and structural sketches; organized and legible	Correct, labelled load diagrams, pressure distributions, code-reference tables, and design summaries; organized and legible

Final Grade Descriptors:

[As appropriate to the course and aligned with university standards]

Grades	Short Description	Elaboration on subject grading description
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A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

[State the course policy on the use of generative artificial intelligence tools to complete assessment tasks.]

N/A

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include strengths and areas for improvement. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

[If applicable, explain the policy for resubmitting work or reassessment opportunities, including conditions and deadlines.]

N/A

Required Texts and Materials

[List required textbooks, readings, and any other materials]

Holmes JD. Wind Loading of Structures. 2nd Edition. London: Taylor & Francis; 2007

Dyrbe C, Hansen SO. Wind Loads on Structures. New York: John Wiley & Sons; 1997.

Simiu E, Scanlan RH. Wind Effects on Structures: Fundamentals and Applications to Design. 2nd Edition. New York: John Wiley & Sons; 1996.

Paz M. Structural Dynamics - Theory and Computation. 4th Edition. Van Nostrand Reinhold, NY; 1997.

Building Department of Hong Kong, "Code of Practice on Wind Effects in Hong Kong 2004", 2004 & 2019.

AS/NZ1170.2, Australian/New Zealand Standard, Structural Design Actions, Part 2: Wind Action, Standards Australia & Standards New Zealand 2002 & 2021.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to [Academic Integrity | HKUST – Academic Registry](#) for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

[Optional] Additional Resources

[List any additional resources, such as online platforms, library resources, etc.]

N/A