

CA8009: WING ENGINEERING

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Wing Engineering

Subject Code

CA - Civil and Architectural Engineering

Course Number

8009

Academic Unit

Architecture and Civil Engineering (CA)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

BC8009 Wind Engineering

Exclusive Courses

Nil

Additional Information

Some courses offered in Summer Term may start a few weeks earlier than the normal University schedule. Please check the teaching schedules with CLs before registering for the courses.

Part II Course Details

Abstract

This course is intended to introduce wind engineering, with particular reference to wind-induced loads acting on and responses of civil engineering structures. The course will enable students to determine wind effects on structures using design codes, wind tunnel test techniques and computational methods.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	apply fundamental principles of wind engineering theory to determine wind effects on civil engineering structures;	40	x	x	x
2	apply wind loading codes for structural design;	20		x	
3	apply experimental methods for determining wind effects on buildings and structures;	20	x	x	
4	discover and analyze structural responses under wind action.	20	x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture and Tutorials	(1) general characteristics of wind actions and associated damages including wind storm, wind damage, atmospheric boundary layer, wind turbulence, bluff-body aerodynamics ; (2) introduction of wind codes for structural design (learn how to use the Code of Practice on Wind Effects, Hong Kong-2004 and other wind loading codes) ; (3) experimental methods of determining wind effects (wind tunnel tests and full-scale measurements) ; (4) determination of structural responses under wind action (effective static loading distributions, structural dynamic analysis and applications of computational fluid dynamics technique).	1, 2, 3, 4	

Additional Information for LTAs

Semester Hours: 3 hours per week

Lecture/Tutorial/Laboratory Mix: Lecture (2); Tutorial (1); Laboratory (0)

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment	1	10	
2	Wind tunnel experiments	1, 3, 4	10	
3	Design project using Hong Kong wind code	2	20	
4	Lab report	1, 3, 4	10	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Additional Information for ATs

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%

Assessment Rubrics (AR)

Assessment Task

Assignment (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to complete the experiments

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Low

Assessment Task

Wind tunnel experiments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to complete the design project

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Low

Assessment Task

Design project using Hong Kong wind code (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to analyze the test data and discuss the results

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Low

Assessment Task

Lab report (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to answer the exam questions

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Low

Assessment Task

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to solve the problems

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Low

Assessment Task

Assignment (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to complete the experiments

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Wind tunnel experiments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to complete the design project

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Design project using Hong Kong wind code (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to analyze the test data and discuss the results

Excellent

(A+, A, A-) High

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Lab report (for students admitted from Semester A 2022/23 to Summer Term 2024)

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Ability to answer the exam questions

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(A+, A, A-) High

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Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to solve the problems

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Wind storm, wind damage, atmospheric boundary layer, wind turbulence, bluff-body aerodynamics, wind loading codes, wind effects on tall buildings and structures, experimental methods of determining wind effects, effective static loading distributions, applications of computational fluid dynamics (CFD) to determine wind effects, comparison with earthquake loading.

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	Choi, E. C. C. (1983). Wind Loading in Hong Kong: Commentary on the Code of Practice on Wind Effects Hong Kong-1983, Hong Kong Institution of Engineers, Hong Kong.
2	Chopra, A.K. (1995). Dynamics of Structures, Prentice Hal.
3	Clough, R. W. and Penzien, J. (1993). Dynamics of Structures, 2nd Edition, McGraw-Hill, Inc. New York.
4	Code of Practice on Wind Effects, Hong Kong-2004.
5	Holmes, J. D. (2001). Wind Loading of Structures, Spon Press, London.
6	Jeary, A. P. (1997). Designer' s Guide to the Dynamic Response of Structures. E & FN Spon.
7	Simiu, E. and Scanlan, R. H. (1996). Wind Effects on Structures: Fundamentals and Applications to Design. John Wiley & Sons, Inc.
8	Tedesco, J. W., Mcdougal W. G. and Ross, C. A. (1999). Structural Dynamics Theory and Application. Addison Wesley Longman, Inc. California.