

CA4644: WIND AND EARTHQUAKE ENGINEERING

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Wind and Earthquake Engineering

Subject Code

CA - Civil and Architectural Engineering

Course Number

4644

Academic Unit

Architecture and Civil Engineering (CA)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

CA3633 Structural Analysis

Students must have attempted (including class attendance, coursework submission, and examination) the precursor course(s) so identified.

Equivalent Courses

BC4644/BC4644P Wind and Earthquake Engineering

Exclusive Courses

Nil

Part II Course Details

Abstract

The course provides students with an understanding on the behavior of structures under dynamic loading. The course will discuss the nature and characteristics of wind load and earthquake load. It will introduce the analysis and design of structures subjected to such loading.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)		
1	explain the nature and general characteristics of wind and earthquake loads;		x	
2	explain the general concept of wind and earthquake-resistant designs of structures;			x
3	explain the basic principle of structural dynamics;			x
4	analysis of structural response under wind and earthquake excitations;			x
5	apply wind codes and earthquake codes for structural design.			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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture and Experiment	Lecture and Wind tunnel testing for a tall building	1, 2, 3, 4	
2	Lecture and Design	Wind-resistant and seismic resistant design of structures	5	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Laboratory Experiment (Wind tunnel testing report)	1, 2, 3, 4	15	

2	Design (Apply wind codes and earthquake codes for structural design)	5	15	
3	Mid-term test	1, 2, 3	20	

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**

Laboratory Experiment (Wind tunnel testing report)

Criterion

1.1 Ability to complete a pressure measurement wind tunnel testing and the report

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Design (Apply wind codes and earthquake codes for structural design)

Criterion

2.1 Ability to apply wind codes and earthquake codes for structural design

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Mid-term test

Criterion

- 1.1 Capacity to understand the nature and general characteristics of wind and earthquake loads.
- 1.2 Ability to explain the general concept of wind and earthquake-resistant designs of structures

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

- 1.1 Capacity to understand the nature and general characteristics of wind and earthquake loads, the basic principle of structural dynamics.
- 1.2 Ability to explain the general concept of wind and earthquake-resistant designs of structures.
- 1.3 Ability to apply wind codes and earthquake codes for structural design

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information**Keyword Syllabus**

Wind characteristics, turbulence, wind loading, extreme probability, response of structures, Hong Kong wind code, earthquake response, earthquake codes, earthquake design of structures.

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	Gould & Abu-Sitta (1980). Dynamic Response of Structures to Wind and Earthquake Loading, Pentech Press.
2	Clough, R. W. and Penzien, J. (1993). Dynamics of Structures, 2nd Edition, McGraw-Hill, Inc. New York.
3	Holmes, J. D. (2001). Wind Loading of Structures, Spon Press, London.
4	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.
5	Simiu, E. and Scanlan, R. H. (1996). Wind Effects on Structures: Fundamentals and Applications to Design. John Wiley & Sons, Inc.
6	Newmark, N.M. and Rosenbleuth, E. (1971). Fundamental of Earthquake Engineering, Prentice Hall.
7	Tedesco, J. W., Mcdougal, W. G. and Ross, C. A. (1999). Structural Dynamics Theory and Application. Addison Wesley Longman, Inc. California.
8	Chopra, A.K. (1995). Dynamics of Structures, Prentice Hal.
9	Wakabayashi, M. (1986). Design of Earthquake Resistant Buildings, McGraw Hill.