

Subject Description Form

Subject Code	CSE513
Subject Title	Tall Building Structures
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	<u>Recommended background knowledge:</u> It is expected that students will have a fundamental understanding of structural analysis and design consistent with undergraduate level study in civil engineering.
Objectives	To provide the students with an appreciation of the structural behaviour of tall building systems under various loading conditions. Emphasis will be placed on both rigorous analytical methods and practical methods of design.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: - understand the fundamental structural concepts for tall building design, and to have an overview of various common structural forms for different ranges of building heights; - appreciate the effects of wind loads in Hong Kong on tall buildings under prevailing codes of practice, and to apply the codes in practice; - analyse various common structural forms adopted in Hong Kong; - work with others as a team to tackle a practical project in analysis and design of a particular form of tall building structures, and to take responsibility for an agreed area of a shared activity.
Subject Synopsis/ Indicative Syllabus	<u>Keyword Syllabus</u> <u>Wind Forces on Tall Buildings</u> Topographic effects on air flow; wind effects on buildings; design considerations and procedures for evaluation of wind loads on buildings. <u>Structural Planning of Tall Buildings</u> General design considerations; choice of floor systems; choice of lateral load resisting systems; choice of structural materials. <u>Modelling Techniques</u> General characteristics of behaviour; common assumptions; design stages and approaches of analysis; various modelling techniques.

	iv) <u>Coupled Shear Walls</u> Equivalent continuum method; wide column frame method; finite element method; behaviour of coupled walls. v) <u>Wall-Frame Systems</u> Equivalent shear cantilever; wall frame interaction. vi) <u>Core Walls</u> Core walls as thin-walled sections; torsion of open sections. vii) <u>Tubular Structures</u> Framed-tube structures; tube in tube structures; equivalent plane frame method for framed tubes; shear lag. viii) <u>Outrigger-Braced Structures</u> Core-outrigger interaction; analysis of outrigger-braced structures; optimum locations of outriggers. ix) <u>Seismic Design of Tall Buildings</u> Seismic loading; seismic behaviour of tall buildings; seismic design of tall buildings.																																								
Teaching/Learning Methodology	Lectures are delivered to cover various topics, including fundamental structural concepts, worked examples and case studies. Coursework, tests, and an individual computer analysis project will be given to ensure that students have thoroughly digested the subject contents. Group projects are assigned and each group is required to review technical papers or analyse a particular form of tall building structures. Students are required to present their work using Powerpoint, and marks are given according to the technical content and skills of presentation. All students are able to share and benefit from the outcomes of the group projects.																																								
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="4">Intended subject learning outcomes to be assessed</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>1. Assignments</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Mid-term Test</td><td>25%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>3. Design Project</td><td>15%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>4. Written Examination</td><td>50%%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>Total</td><td>100%</td><td colspan="4"></td></tr></table>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				a	b	c	d	1. Assignments	10%	✓	✓	✓	✓	2. Mid-term Test	25%	✓	✓	✓		3. Design Project	15%	✓	✓	✓	✓	4. Written Examination	50%%	✓	✓	✓		Total	100%				
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	Students must pass the final examination and achieve a passing overall score / grade to pass the subject. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Continuous assessment is based on a test, a project report and the oral presentation of the design project. Written examination is evaluated by final examination.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Mid-term Test & Project Presentation	6 Hrs.
	Other student study effort:	
	▪ Assignments	24 Hrs.
	▪ Design Project	48 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	<u>Books</u> Hong Kong Buildings Department, <i>Code of Practice on Wind Effects in Hong Kong</i> (2019). MacDonald, A.J. and Coull A., <i>Wind Loading on Buildings</i>, Applied Science Publishers Ltd. (1975). Murray, N.W., <i>Introduction to the Theory of Thin-walled Structures</i>, Oxford Engineering Science Series (1984). Smith, B.S. and Coull A., <i>Tall Building Structures: Analysis and Design</i>, John Wiley (1991). Taranath, B.S., <i>Steel, Concrete, and Composite Design of Tall Buildings</i>, McGraw-Hill (1998). Taranath, B. S., <i>Structural Analysis and Design of Tall Buildings</i>, McGraw-Hill (1988). Taranath, B.S., <i>Wind and Earthquake Resistant Buildings – Structural Analysis and Design</i>, Marcel Dekker (2005). <u>Journals</u> ACI Structural Journal Engineering Structures ICE Proceedings-Structures and Buildings Journal of Structural Engineering, American Society of Civil Engineers The Structural Design of Tall and Special Buildings	