

Subject Code	CSE28363
Subject Title	Structural Concrete Design
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite(s): CSE19100 Mechanics of Materials AND CSE20351 Applied Structural Analysis
Objectives	(1) To enable students to acquire basic knowledge of structural concrete design; and (2) To equip students with basic design methodology of reinforced concrete structures.
Intended Learning Outcomes	Upon completion of the subject, students will be able: (a) to apply structural mechanics and engineering mathematics to rational design of concrete structures; (b) to develop an appreciation of design philosophy of concrete structures as well as their structural behavior; and (c) to appreciate economic and efficient use of concrete and steel as constructional materials and to understand their engineering properties for practical applications in construction.
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none"> 1. <u>Fundamentals of design of concrete structures</u> Basic structural forms; Limit state design; Properties of concrete and steel reinforcement; Design principles. 2. <u>Force and stress analyses of members</u> Moment distribution method; Composites beams; Beams of two materials; Simplified analysis for lateral load. 3. <u>Design of basic structural members</u> Analysis of sections; Design of beams with a rectangular and flanged section; Design of one-way slabs; Design of short columns; Serviceability; Durability; Bond and anchorage. 4. <u>Design of special structural components</u> Design of staircase, footings and pile caps, and retaining walls. 5. <u>Laboratory work</u> Mechanical properties test of concrete and steel; Flexural test of a reinforced concrete beam.
Teaching/Learning Methodology	<p>Fundamental knowledge will be covered in lectures. Tutorials will provide opportunities for discussion of lecture materials, and will also be conducted in the form of example classes and problem-solving sessions to supplement understanding from lectures.</p> <p>Laboratory tests are required and they will help students appreciate basic principles and familiarize themselves with basic instruments under an environment of group effort.</p>

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
			a	b	c
	1. Assignment, laboratory reports, and class project	20	✓	✓	✓
	2. Quizzes and mid-term test	10	✓	✓	✓
	3. Final examination	70	✓	✓	✓
Total	100				
<p>Students must attain at least grade D in both coursework and final examination assessments (whenever applicable) in order to attain a passing grade in the overall result.</p> <p>The students will be assessed with four components, i.e., 1. Assignments and class project, 2. Laboratory report, 3. Quizzes and mid-term test, and 4. Final examination at the end of the semester.</p> <p>The students will be required to attend laboratory sessions and submit group laboratory report. These laboratory sessions will enable students to acquire basic laboratory techniques and technical report writing. The laboratory experiments and the assignments are closely related to mechanical properties test of concrete and steel, structural behaviour, analysis and design of concrete members, and the students will have to exercise engineering judgments in completing all the coursework. Hence, they are considered to be highly effective in achieving the intended learning outcomes a), b), and c). Moreover, the mid-term test and the final examination are designed to assess the basic concepts as well as the practice on structural concrete design of the students, and they are effective to achieve all the intended learning outcomes.</p>					
Student Study Effort Expected			Average hours per week		
	Class contact:				
	▪ Lectures/ Tutorials/Laboratory sessions		3 Hrs.		
	Other student study effort:				
	▪ Reading and studying of reference materials		3 Hrs.		
	▪ Assignments and laboratory reports		3 Hrs.		
Total student study effort		9 Hrs.			
Reading List and References	<p>Books Reynolds, C.E. and Steedman, J.C. 2003, <i>Examples of the Design of Reinforced Concrete Buildings to BS8110</i>, 4th edition, E. & F.N. Spon, London.</p> <p>Mosley, W.H., Bungey, J.H. and Hulse, R., 2007, <i>Reinforced Concrete</i></p>				

Design to Eurocode 2, 6th edition, Palgrave MacMillan, New York.

Design standards

Code of Practice for Structural Use of Concrete, 2013, Buildings Department, The Government of Hong Kong HKSAR.

Various Parts of Eurocode 2: Design of Concrete Structures.

Various Parts of Eurocode 3: Design of Steel Structures.

Various Parts of BS8110 Structural Use of Concrete: Code of Practice for Design and Construction, British Standards Institution.