Subject Description Form

Subject Code	CSE30310
Subject Title	Design of Concrete Structures
Credit Value	3
Level	3
Pre-requisites / Exclusion	Pre-requisites: CSE204 Structural Mechanics II or CSE20204 Advanced Structural Mechanics Exclusion: CSE310 Design of Concrete Structures
Objectives	(1) to provide students with the knowledge to properly design reinforced concrete structures and simple prestressed concrete structures; (2) to provide students with the knowledge on proper construction details for the design and the fundamental knowledge for more advanced training in concrete structures design after graduation to solve complex engineering problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. acquire basic knowledge on the design concepts and detailing techniques of the slabs, beams, columns, walls, and foundations of reinforced concrete structures; b. understand the basic design principles of prestressed concrete beams; c. carry out practical design of concrete elements according to code requirements and communicate logically and lucidly through construction drawings and calculations; d. appreciate the performance of concrete structures through design calculations and laboratory tests and understand the limitations of design assumptions through the laboratory tests. e. recognize the need for, and to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	1. Fundamentals of design (2 weeks) Mechanical properties of reinforced concrete. Typical structural forms. Limit state design. Load Combinations. Load Cases. Analysis of the structure. 2. Design of beams, slab and columns (8 weeks) Sectional analysis. Shear, bond and torsion. Serviceability, durability and stability. Design of reinforced concrete beams. Design of reinforced concrete slabs. Design of reinforced concrete columns. 3. Design of other structural elements (1 weeks) Footings, Foundations, Staircases. Footings and Pile caps.

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<tr><td></td><td>4. <u>Principles of prestressed concrete</u> (2 weeks)
Principles of prestressing. Methods of prestressing. Analysis of prestressed concrete section under working loads. Design for the serviceability limit state and ultimate limit state.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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 class and problem-solving session to supplement understanding from lectures. Assignments will help students to consolidate the knowledge learnt from the lectures and train them how to implement the code requirements into practical design. Laboratory work will help students to appreciate the basic principles and familiarize themselves with the basic instruments.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>1. Assignments</td><td>10</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>2. Mid-term test(s)</td><td>10</td><td>√</td><td></td><td>√</td><td></td><td></td></tr>
<tr><td>3. Laboratory report</td><td>5</td><td>√</td><td></td><td>√</td><td>√</td><td></td></tr>
<tr><td>4. Seminar report</td><td>5</td><td>√</td><td>√</td><td></td><td></td><td>√</td></tr>
<tr><td>5. Final examination</td><td>70</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td><td></td></tr>
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Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The students will be assessed with five components, i.e., a laboratory session, assignments, a seminar report, mid-term written test(s) and a written examination at the end of the semester.

Students will be required to complete regularly assignments. These regular assignments attached to corresponding lecture contents are closely related to practicing engineering requirements on structural concrete design. They will help students to enhance their understanding of the basic design principles and procedures learnt from lectures and exert their engineering judgments to solve practical engineering problems. They are very suited for the intended learning outcomes a, b, c and d. The students will also be required to attend a laboratory session and submit group</td></tr>
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<tr><td></td><td colspan="2">laboratory reports. These laboratory sessions will enable students to acquire basic laboratory techniques and report writing and to understand the limitations of design assumptions. The purpose of providing laboratory sessions will also help students to achieve the intended learning outcomes a, c and d. Students will also be required to attend a technical seminar closely relevant to the subject and submit a seminar report. This will help students to enhance their life-long learning ability and achieve the intended learning outcomes a, b and e.

The mid-term test(s) and the final examination at the end of semester test will emphasize on assessing students' understanding of the basic concepts and current practices of design of concrete structures. They will help students to consolidate their learning from lectures, tutorials, and the laboratory session and are well suited for the intended learning outcomes a, b, and c.</td></tr>
<tr><td rowspan="6">Student Study Effort Expected</td><td>Class contact:</td><td>Average hours per week</td></tr>
<tr><td>▪ Lectures / Tutorials / Laboratory</td><td>3 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Reading and studying</td><td>3 Hrs.</td></tr>
<tr><td>▪ Completion of Assignments/Lab Reports</td><td>3 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>9 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Mosley, W.H. and Bungey, J.H. "Reinforced Concrete Design", 5th edition, Palgrave, 1999.

Kong, F.K. & Evans, R.H. "Reinforced and Prestressed Concrete", Chapman and Hall (UK), 3rd edition, 1987.

Buildings Department, the Hong Kong Special Administrative Region, Code of Practice for Structural Use of Concrete 2013.

BS EN 1992-1-1:2004, Eurocode 2: Design of Concrete Structures – Part 1-1: General rules and rules for buildings

BS EN 1992-1-2: 2004 Eurocode 2: Design of Concrete Structures –General rules –structure fire design</td></tr>
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