Subject Description Form

Subject Code	CSE519
Subject Title	Advanced Reinforced Concrete
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Recommended background knowledge: It is expected that students have completed an undergraduate course in reinforced concrete theory.
Objectives	a. To introduce mix design criteria; physical, mechanical, and durability properties of conventional and unconventional concretes. b. To introduce fire performance of reinforced concrete. c. To deepen understanding of flexural, shear and torsion behaviours of reinforced concrete elements. d. To introduce various repair and retrofitting methods of reinforced concrete members. e. To introduce basic concepts of FRP-strengthened concrete members.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. to apply the fundamental knowledge of reinforced concrete to formulate effective solutions to reinforced concrete design and practice; b. to identify technological considerations on repair and retrofitting; c. to work with others in group works and to take responsibility for an agreed area of shared activities; and d. to have creative and critical thinking and ability to work independently.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** i) Mix Proportions and Properties of Concretes Mix design criteria, mechanical and durability properties of normal strength concrete, high strength concrete, self-compacting concrete, and marine concrete Fire Performance of Reinforced Concrete ii) Mechanical /durability properties and design considerations of normal and high strength reinforced concretes under/after exposure to fire

<table>
<tr><td></td><td>iii) <u>Flexural, Shear and Torsion Models of Reinforced Concrete Members</u>

Flexural strength and ductility of unconfined and confined concretes, Classical Truss Model, Variable-Angle Truss Model, Tie and Strut Model

iv) <u>Repair and Retrofitting of Concrete Structures</u>

Methods of repair and strengthening

v) <u>FRP-Strengthened Concrete Members</u>

Basic properties of FRP composites; Flexural and shear strengthening of RC beams; FRP-confined concrete and column strengthening</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures will provide fundamental knowledge relating to the theoretical mechanical behavior and design of reinforced concrete structures. Students will be required to undertake various coursework activities, which will enable them to thoroughly digest the taught content.

Tutorials will provide opportunities for students and lecturers to communicate and discuss any difficulties relating to the lectures.

Independent study and associated reading will require students to conduct some problem-solving exercises independently.</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="4">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></tr>
<tr><td>1. Continuous Assessment</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Written Examination</td><td>70%</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Continuous assessment will be based on (i) course assignments (15%), and (ii) a written report of case study and an oral presentation (15%).

Written examination is evaluated by final examination.</td></tr>
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	Students must pass the final examination and achieve a passing overall score/ grade to pass the subject.
Reading List and References	Hsu, T.T.C. (1984), *Torsion of Reinforced Concrete*, Van Nostrand Reinhold Company, New York. International Journals on Concrete Materials, Concrete and Composite Structures. MacGregor, J.G. (1997), *Reinforced Concrete Mechanics and Design*, Prentice Hall, New Jersey. Neville, A.M. (1997), *Properties of Concrete* 4th Ed., Longman., England. Paulay T., and Priestley, M.J.N. (1992), *Seismic Design of Reinforced Concrete and Masonry Structures*, John Wiley and Sons, England. Teng, J.G., Chen, J.F., Smith, S.T., and Lam, T. (2002), *FRP-strengthened RC Structures*, John Wiley and Sons, England.