CA3634: REINFORCED AND PRESTRESSED CONCRETE STRUCTURES

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Reinforced and Prestressed Concrete Structures

Subject Code
CA - Civil and Architectural Engineering
Course Number
3634

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
CA2673 Engineering Mechanics, and CA2674 Construction Materials, and CA3619 Design of Structural Elements

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

Equivalent Courses
BC3634/BC3634P Reinforced and Prestressed Concrete Structures

Exclusive Courses
Nil

Part II Course Details

Abstract

The course provides knowledge, theory and training for the analysis and design of reinforced and prestressed concrete members, and fosters an attitude for discovery by identifying problems in existing RC theory and understanding the latest developments in the subject.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify the typical failure modes of RC members and explain the importance of the general reinforced concrete design concept			x	
2	Determine appropriate approaches to calculate the design strength for each typical failure mode			x	
3	Apply the principles and procedures to the design of reinforced concrete slabs, beam, columns, walls, etc			x	
4	Apply the basic theory of prestressed concrete to structure designs			x	
5	Understand the problems and limitations of the current RC theory, and develop an interest in research and making discovery.		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	Basic concepts, principles, theories, design methodologies and codes	1, 2, 3, 4, 5	2 hrs/week
2	Tutorial	Basic training of design procedures	1, 2, 3, 4	1 hr/week
3	RC Practical	Observation of basic failure modes of RC members	1, 5	
4	Guest Speech or Video Show	Prestressed concrete practice	4	

5	RC Practical Report Writing	Test observations, theoretical predictions, and comparison between them	1, 2, 5	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	RC Practical Report	1, 2, 5	15	
2	Assignments	2, 3, 4	15	
3	Tests	2, 3, 4	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

RC Practical Report

Criterion

CAPACITY to IDENTIFY/PREDICT typical RC failures and DISCUSS/COMMUNICATE findings

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

Assignments

Criterion

ABILITY to APPLY suitable knowledge to calculation and design of RC members

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
Tests

Criterion
ABILITY to APPLY available knowledge and tools in RC 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
Examination

Criterion
ABILITY to APPLY knowledge and tools in evaluation and design of RC members

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

Code models of steel and concrete, loads and load combinations, strength and serviceability limit states, ultimate strength in bending, compression and shear, deflections, design of beams, columns and slabs, prestressed concrete.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Mosley, B., Bungey, J., and Hulse, R. 2012, Reinforced Concrete Design to Eurocode 2, 7th Edition, Palgrave MacMillan, New York. (5th Edition to BS code: Mosley, W.H., Bungey, J.H. & Hulse, R. Reinforced Concrete Design, Macmillan, Basingstoke).
2	Buildings Department 2013, Code of Practice for Structural Use of Concrete, the Government of the Hong Kong Special Administrative Region.
3	The Hong Kong Institution of Engineers 2006, Concrete Code Handbook, an explanatory handbook to the Code of Practice for Structural Use of Concrete 2004, Structural Division of the Hong Kong Institution of Engineers.
4	Reynolds, C.E., Steedman, J.C. and Threlfall A.J. 2008, Reynolds's Reinforced Concrete Designer's Handbook, 11th edition, Taylor & Francis, London.
5	Reynolds, C.E. and Steedman, J.C. 2003, Examples of the Design of Reinforced Concrete Buildings to BS8110, 4th edition, E. & F.N. Spon, London.
6	Wight, J.K, Macgregor, J.G. 2012, Reinforced Concrete: Mechanics and Design, 6th edition, Pearson, Boston.
7	Nilson, A.H., Darwin, D. and Dolan, C.W. 2004, Design of Concrete Structures, 13th edition, McGraw-Hill, Boston.
8	Spiegel, L. and Limbrunner, G.F. 2003, Reinforced Concrete Design, 5th Edition, Prentice Hall, Upper Saddle River, N.J.
9	British Standards Institute. BS8110-1:1997 Structural use of concrete-Part 1: Code of practice for design and construction.
10	British Standards Institute. BS8110-2:1985 Structural use of concrete-Part 2: Code of practice for special circumstances.
11	British Standards Institute. BS8110-3:1985 Structural use of concrete-Part 3: Design charts for singly reinforced beams, doubly reinforced beams and rectangular columns.
12	http://bccw.cityu.edu.hk/rc.design